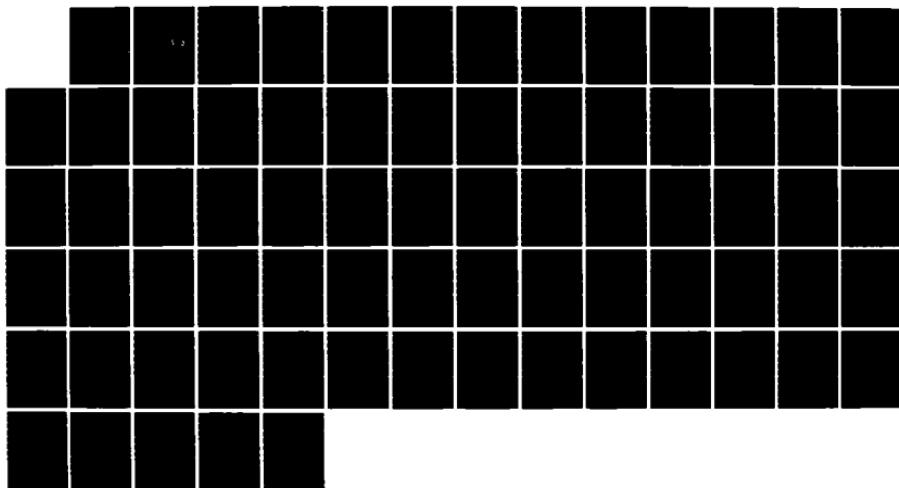
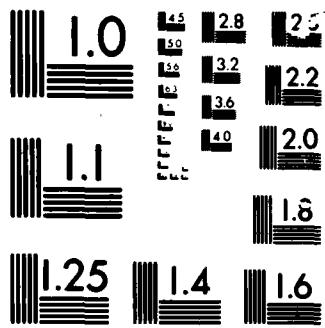


RD-R167 848 A DATA BASE EDITOR FOR MOODS (MASTER OCEANOGRAPHIC
OBSERVATIONS DATA SET)(U) NAVAL OCEAN RESEARCH AND
DEVELOPMENT ACTIVITY NSTL STATION MS W J TEAGUE ET AL.
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Naval Ocean Research and Development Activity
February 1986

Report 136



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A Data Base Editor for MOODS

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Foreword

One of the most complete sets of oceanographic profile data available to the U.S. Navy is contained in the Master Oceanographic Observation Data Set (MOODS). MOODS is global and contains such physical oceanographic data as sea-surface temperature, bathythermographs, and salinity-temperature-depth records.

The primary requirements moving the Navy into MOODS development were to make climatologies available to the fleet and to provide environmental inputs to acoustical models. Bad data, naturally, blocks these goals and this report deals with a data base editor that attempts to ferret out erroneous data.



**R. P. Onorati, Captain, USN
Commanding Officer, NORDA**

Executive summary

The Master Oceanographic Observations Data Set (MOODS) contains 3.5 million data observations. The data, which include temperature and salinity profiles, are edited during updates, but this editing has been very superficial and allows for erroneous values. This editor attempts to ferret out the bad data by checking for oceanographic observations that are over land, above the sea surface, below the sea bottom; that have nonmonotonic, duplicate, or negative depths; that contain impossible or all-zero temperatures or salinities; that produce temperature or density inversions; that are misplaced either by location or by season; or that are duplicates. For four MOODS test sets (two Atlantic and two Pacific), the total rejection rate ranged 17-39%. Of these rejections, 9-16% were already flagged during update editing, 1-8% were rejected because of inversions and wild values, and 7-17% were duplicate and misplaced profiles.

Acknowledgments

This work was supported by the Nonacoustic ASW Oceanography Program, Program Element 63704N, through the Applied Oceanography and Geophysics Division, Kenneth M. Ferer, program manager.

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QUALITY
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A data base editor for MOODS

Introduction

Large oceanographic data bases are valuable for many applications: climatological estimates of surface and subsurface temperatures, heat content, layer depths, currents (via geostrophy), and frontal locations. Such estimates are useful for describing and comparing ocean regions, priming numerical models, and editing or calculating anomalies from present observations.

One of the most complete sets of oceanographic profile data is contained in the Master Oceanographic Observation Data Set (MOODS). MOODS is global, and contains such physical oceanographic data as sea-surface temperatures, mechanical and expendable (air and ship) bathythermographs, and hydrocast and other salinity-temperature-depth records. Source data were supplied by Argentina, Australia, England, France, Japan, Korea, Norway, and the United States (Fleet Numerical Oceanography Center, Lamont-Doherty Geophysical Laboratory, National Marine Fisheries Service, National Oceanographic Data Center, and Scripps Institution of Oceanography). These data (about 3.5 million observations for the years 1920-1982) are arranged by months and regions, have the same units (degrees centigrade, parts per thousand, meters), and are in a single format with sufficient information to trace sources (Bauer, 1985). The time interval between the time an observation is made and the inclusion of the data into MOODS is at least one year and is often several years.

The primary requirements driving the U. S. Navy into MOODS development were to make climatologies available to operational forces and to provide environmental inputs to acoustical models. MOODS brings together data, often acquired through different types of instrumentation, from many organizations. The quality of the data is often unknown. The characteristics of a particular data set can bias the data statistics in systematic ways, which are difficult to recognize unless there are observations to provide a context. Judgments pertaining to data quality can be made only through experience and training. MOODS makes the data available to anyone with a knowledge of computers, so there is a danger that the data will be used by individuals with little oceanographic training.

An effort has been made to flag questionable data upon inclusion into MOODS. Data are flagged as questionable for over land, maximum depth errors, platform speed errors, sea-surface temperature (SST) range errors, platform call-sign discrepancies, and duplicate profiles. Profiles are flagged as duplicates or near duplicates of each other because of the multipath nature of data that enter MOODS (for example, duplicates can occur when the same data reside in several MOODS source locations); however, erroneous data and duplicate profiles do slip in unflagged. By using only unflagged data, the user is only partially protected from erroneous data. Quality control is becoming critical as more users begin to rely on MOODS. As this file, which is accessible to the oceanographic community, becomes more and more used, a critical need for additional quality control of the data set has arisen. This report describes an editor that can be used for editing data contained in MOODS. The editor is not specifically tailored to MOODS, and thus can also be used for editing other data bases with similar structure. All the computer programs that make up the editor are written in FORTRAN 77. The computer program package for the editor is described in Appendix A and listed in Appendix C. In Appendix B, usage of the editor is discussed in conjunction with implementation of MOODS on a microcomputer.

Editing approach

The editor was designed for use during extracting or updating the MOODS data base. The editor is designed to be flexible to changing conditions; that is, a set of default values are suitable for many of the editor utilizations, but the user maintains flexibility to tailorize the defaults for specific data. Data output is in the same format as input. An error log is produced so that profile rejections are tabulated and later checked, if desired.

The editor behaves as if it were a series of filters. Profiles that enter the filter series are discarded if they do not pass various editor tests. For error conditions that are not fatal, an attempt is made to repair the profile, and then the profile must pass the other editor checks. The following is a list of editor checks, which can be turned

on or off (with the exceptions of 4, 5, and 6), and default edit parameters, which can be changed by the user:

1. MOODS error flag—duplicate profiles discarded.
2. Over land—profile discarded.
3. Depth bounds—profile discarded if maximum depth exceeds 6500 m (default).
4. Unsorted depths—depths are sorted and data retained.
5. Duplicate depths—data at duplicate depths removed and only last set kept.
6. Negative depths—depths changed to positive and retained.
7. Depths below the bottom—profile discarded if depth exceeds local bathymetry by 1% (default).
8. Temperature bounds—profile discarded if data falls outside the range from -2.5°C to 32.0°C (defaults) from the surface to 1000 m (default). Then the temperature limits change from -2.5°C to 12.0°C (defaults).
9. Salinity bounds—profile discarded if data falls outside the range from 33.0 to 37.0 ppt (defaults) from the surface to 1000 m (default). Then the salinity limits change from 34.0 to 36.0 ppt (defaults).
10. Temperatures all zero—profile discarded.
11. Salinities all zero—salinities discarded.
12. Temperature inversion—profile discarded for inversion greater than 1°C (default) between the surface (default) and the bottom of the profile. The user can set the first default for more stringent editing, and the second default for ignoring near-surface inversions that can occur.
13. Density inversion—profile discarded for in situ density inversion greater than 10^{-5} gr/cm³ (default) between the surface (default) and the bottom of the profile.
14. Misplaced profiles—profile discarded if sea surface temperature differs by more than 3.5 standard deviations (default) from mean sea surface temperature of the subset of MOODS that is being edited. Assume that either the location or month is wrong.
15. Duplicate profiles—shallower profiles discarded if two or more profiles are within ± 5 km and ± 30 minutes of each other. This test finds the same data that have entered the base by different sources; it also finds closely spaced time series data.

Test applications

Four data extractions were made from the MOODS data base to test the editor. The data sites were Northwest Atlantic—January (2831 profiles) and Northeast

Atlantic—January (1076 profiles) (Fig. 1), and Northeast Pacific—July (825 profiles) and Northeast Pacific—January (889 profiles) (Fig. 2). Results are presented in Table 1. The total percentage of rejections ranged from 17% in the Northeast Pacific in July to 39% in the Northwest Atlantic in January. The larger number of rejections in the Northwest Atlantic can perhaps be attributed to a greater amount of ship-of-opportunity observations (with less quality control) in this region than in the other test regions.

Temperature and density inversions (Fig. 3, for example) accounted for the majority of profile rejections by the ocean limits test. These inversions result from one or more erroneous temperatures or salinities in a profile. Edit parameters were more rigorously chosen here than when the data were edited upon initial inclusion in MOODS.

Misplaced profiles, profiles with incorrect geographical positions or incorrect dates, accounted for about 1% of the rejections. Most were probably a result of transposed digits in the profile positions or dates contained in the header. Each rejection in all four test sets was verified to confirm that the test excluded obvious misplaced profiles.

A significant percentage of duplicate profiles not already flagged in MOODS (4–16%) was also found. In most cases these duplicates were copies of profiles that were digitized at different levels, cut off at a shallower depth, or contained only sea-surface temperatures. The percentages of profiles flagged as duplicates as a function of time and space are summarized for the Northwestern Atlantic test case in Table 2. For the default values of ± 5 km and ± 30 minutes, 16% of the profiles were flagged as duplicates. These defaults were scrutinized by manually checking every flagged duplicate in all four test sets.

Changing these duplicate check defaults could be useful in several other applications. For example, the data could be thinned when independent rather than clumped observations are required for a statistical application. Also, this feature of the editor could be used in the opposite manner to seek out (via the log file) all closely spaced time-series data in a region.

Conclusions

These additional quality control measures will be valuable during the updating of the MOODS data base. The existing data base contains a significant amount (17–39% for the four test sets) of bad data. Duplicate profiles add overhead to the management of the data base and bias data statistics. For MOODS updates or extractions, we recommend that the data be passed through an editor such as this one in which the edit parameters can be tailored. Passing the entire MOODS data base through

the editor and consequently rebuilding the data base should also be considered.

The editor described here can be used on most computers, and since it is not tailored specifically for the MOODS data base, can be used on other data bases. The data format output by the editor is identical to the data input format, and the program is flexible and user friendly. Default editor parameters can be changed readily by the user. Profile rejections are tabulated in an error log file, which also can serve as a guide for tightening or loosening editor default parameters.

Bibliography

Bauer, R. A. (1985). *Functional Description Master Oceanographic Data Set (MOODS), Documentation Report*. Compass Systems, Inc., San Diego, California.

Bauer, R. A. (1983). *Users Guide for Univac 1180 Master Oceanographic Observation Data Set Access Routines*. Compass Systems, Inc., San Diego, California.

Kassoff, L. E. (1983). *MOODS Users's Guide, STD-N-214*. John Hopkins University Applied Physics Laboratory, Laurel, Maryland.

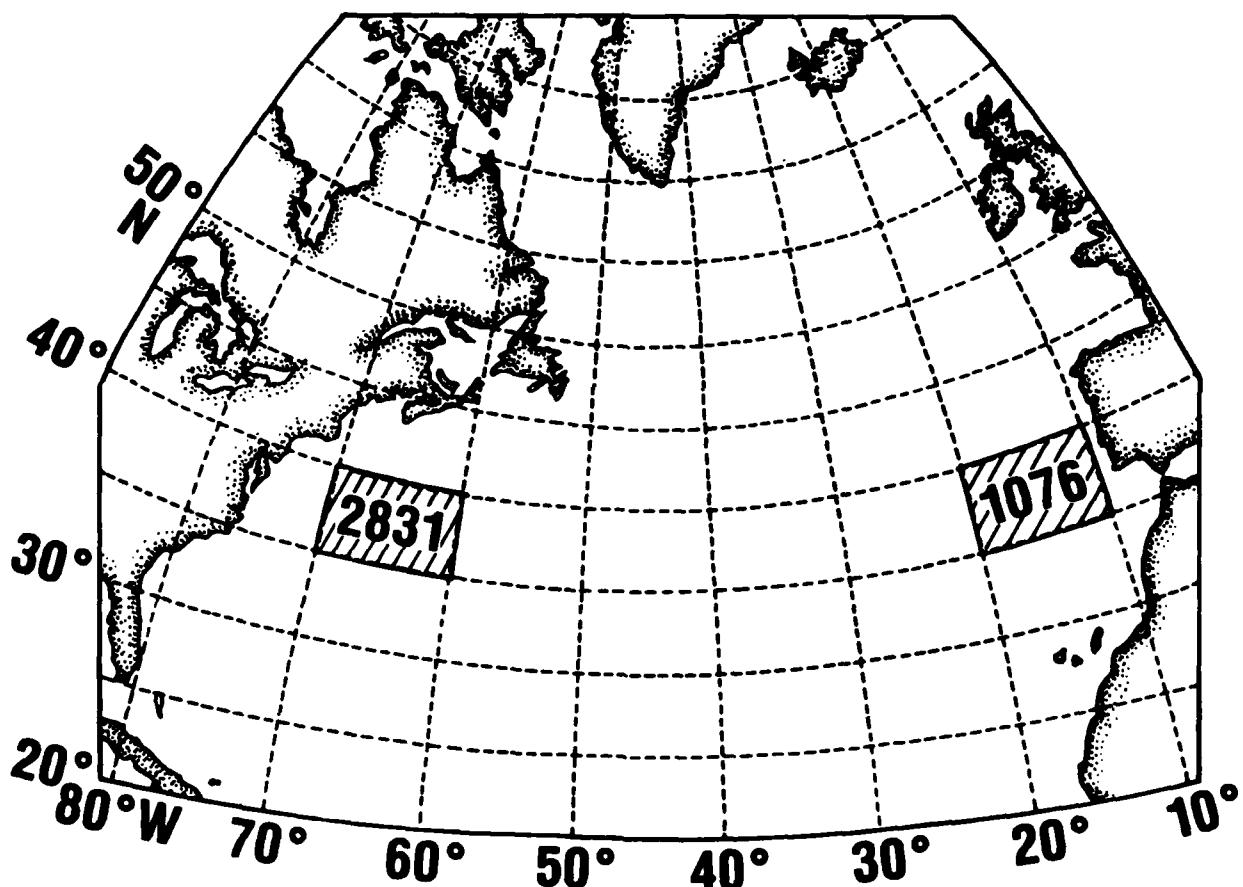


Figure 1. The editor was tested with 1076 January profiles obtained from a region off the west coast of Africa and 2831 January profiles obtained from a region off the east coast of the United States.

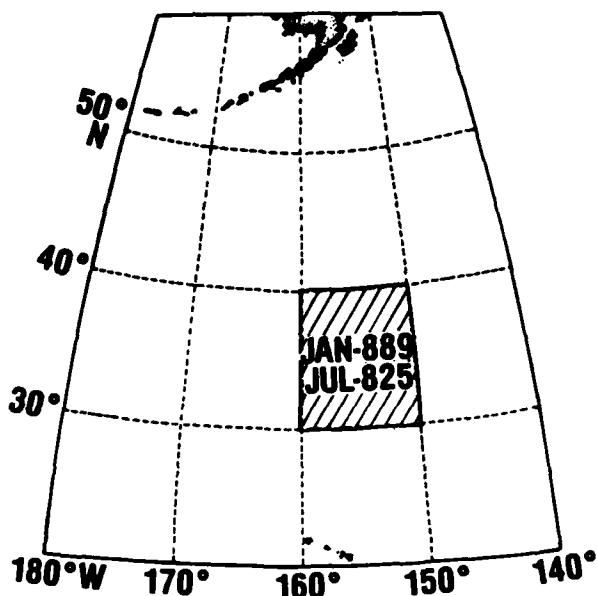


Figure 2. The editor was tested with 889 January profiles and 825 July profiles obtained from a region in the northeast Pacific Ocean.

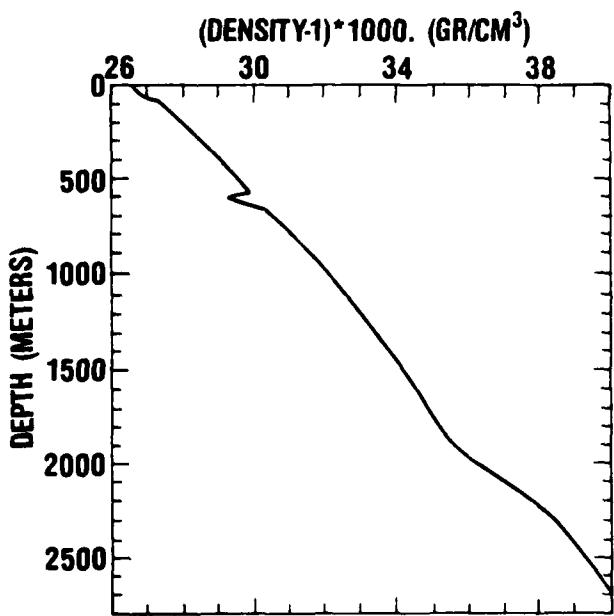
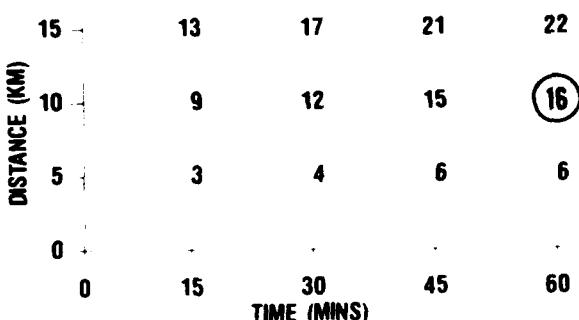


Figure 3. The editor will reject this profile due to the density inversion occurring near 600 m.

Table 1. Summary of profile rejections.

Data Set	OBS	Duplicate Profiles Flagged by Module Error Code	Failed Biogeographic Limit Tests	Additional Duplicate Profiles	Misplaced Profiles	% Total
W Coast Africa (JAN)	1076	16	2	4	1	23
NE Pacific (JUL)	825	9	2	6	0	17
NE Pacific (JAN)	889	13	5	7	0	25
East Coast USA (JAN)	2821	9	13	16	1	39

Table 2. Percentages of profiles flagged as duplicates, as a function of time and distance between profiles, are summarized for the Northwestern Atlantic test case.



Appendix A: Editor input control

APPENDIX A

EDITOR INPUT CONTROL

All programs in the editor package were written in standard ASCII FORTRAN and were tested on VAX 11/750 and UNIVAC 1180 computers. The editor takes output from the MOODGET routine (located in the program file MOODS*PROGRAMS, on the NAVOCEANO UNIVAC, and DRBO:[BILL.MOODS] on the NORDA Code 331 VAX) as input and eliminates the bad or questionable profiles. Output from the editor, which consists of profiles written in the same format as the input profiles, is readable with the text editor. A summary detailing which profiles have been removed and why is given in a log file, "INPUTFILENAME*LOG" (UNIVAC) or "INPUTFILENAME.LOG" (VAX).

The main program, MOODSED, calls DEPTHIC, DUPGET, GMLIC, INVERC, NODAYS, RDIN, RDMOOD, SOLIC, SORT, STATS, VALUEC, WEMOOD, DB2DEP(UNIVAC), and LNDCHK (UNIVAC) or LANDMASK (VAX). The subroutine (DB2DEP), which checks the depth of the bottom, and the corresponding bathymetric data file were not available on the VAX.

Program input is entered by instructions or prompted via questions by typing "HELP" upon program execution. Instructions, which are summarized below, may be entered in any order.

Editor instructions:

```
IFIL  input filename (default MOODINS).
OFIL  output filename (default MOODSOUT).
TMIN  minimum temperature allowed (default -2.5).
TMAX  maximum temperature allowed (default 32.0).
SMIN  minimum salinity allowed (default 32.0).
SMAX  maximum salinity allowed (default 40.0).
TL01  minimum temperature allowed past ZMIN (default -2.5).
THI1  maximum temperature allowed past ZMIN (default 12.0).
SL01  minimum salinity allowed past ZMIN (default 34.0).
SHI1  maximum salinity allowed past ZMIN (default 36.0).
ZMIN  depth at which to change limits, TL01, etc. (default 1000).
ZMAX  maximum depth allowed (default 6500).
LCHK  set to 1 to skip land checking (default 0).
IDCK  set to 1 to skip neg. and non-mon. depth checks (default 0).
IECK  set to 1 to skip MOODS dup profile error code checking (default 0).
IBCK  set to 1 to skip depth thru bottom checking (default 0).
ITOC  set to 1 to skip checking for all-zero temps (default 0).
ISOC  set to 1 to skip checking for all-zero salinities (default 0).
ISBC  set to 1 to skip checking for bad salinities (default 0).
ITBC  set to 1 to skip checking for bad temperatures (default 0).
IVCK  set to 1 to skip checking for density/temp inversions (default 0).
ZIVC  check for inversions beyond this depth (default 0.0).
DTOL  tolerance for density inversion check (default 0.00001).
TTOL  tolerance for temperature inversion check (default 1.0).
BTOL  through bottom depth check tolerance, % (default 1.0 %).
IMIS  set to 1 to skip checking for misplaced profiles (default 0).
DMIS  maximum depth of near SST for misplaced profile check (default 20.0).
STOL  standard deviation tolerance for mislplaced prof check (default 3.5).
IDUP  set to 1 to skip duplicate profile check (time-dist. window) (default 0).
```

IMIN time window in minutes for dup. prof check (default 30).
DIST distance window in km for dup. prof check (default 5.0).
C comment statement, no action.
@END ends instructions and begins program execution (UNIVAC).
CTRL Z "CTRL Z" ends instructions and begins program execution (VAX).

Example run (UNIVAC) with instruction file input:

```
@RUN MOODSED  
C   DEFINE INPUT FILENAME  
IFIL MOODSDAT  
C   DEFINE OUTPUT FILENAME  
OFIL OUTFILE  
C   IGNORE ALL ZERO SALINITIES  
ISOC 1  
C   SKIP LAND CHECKING  
LCHK 1  
@END
```

Questions are solicited upon typing "HELP". A blank return maintains the default value. Program execution begins upon answering last question or by typing "@END for UNIVAC execution or "CTRL Z" for VAX execution. The questions are summarized below.

INPUT FILENAME?
OUTPUT FILENAME?
CHECK FOR BAD TEMPERATURES? DEFAULT IS YES
MINIMUM TEMPERATURE (DEG C) ALLOWED IS -2.500000
NEW MINIMUM TEMPERATURE?
MAXIMUM TEMPERATURE (DEG C) ALLOWED IS 30.000000
NEW MAXIMUM TEMPERATURE?
CHECK FOR BAD SALINITIES? DEFAULT IS YES
MINIMUM SALINITY ALLOWED IS 33.000000
NEW MINIMUM SALINITY?
MAXIMUM SALINITY ALLOWED IS 38.000000
NEW MAXIMUM SALINITY?
MAXIMUM DEPTH (M) ALLOWED IS 6500.000
NEW MAXIMUM DEPTH?
CHECK FOR TEMP/DENSITY INVERSIONS? DEFAULT IS YES
MAXIMUM TEMP. INVERSION (DEG C) ALLOWED IS 1.000000
NEW MAXIMUM TEMPERATURE INVERSION?
MAXIMUM DENSITY INVERSION (GM/CMM**3) ALLOWED IS 9.9999997E-06
NEW MAXIMUM DENSITY INVERSION?
CHECK FOR INVERSION BEYOND DEPTH 0.0000000E+00 M
NEW DEPTH?
CHECK FOR DEPTHS GREATER THAN BOTTOM? DEFAULT IS YES
BOTTOM CHECKING - PERMISSIBLE DEPTH ERROR (%) 1.000000
NEW DEPTH ERROR (%)?
CHECK FOR DATA OVER LAND? DEFAULT IS YES
CHECK FOR NEGATIVE, AND NON-MONOTONIC DEPTHS?
DEFAULT IS YES
CHECK MOODS DUPLICATE PROFILE ERR CODE? DEFAULT IS YES
CHECK IF TEMPERATURES ARE ALL ZERO? DEFAULT IS YES
CHECK IF SALINITIES ARE ALL ZERO? DEFAULT IS YES

CHECK FOR MISPLACED PROFILES? DEFAULT IS YES
MAX STANDARD DEVIATION IS 3.500000
NEW MAX STANDARD DEVIATION?
MAX DEPTH OF NEAR SURFACE TEMP IS 20.00000 M
NEW MAX DEPTH?
CHECK FOR DUPLICATE PROFILES? DEFAULT IS YES
MAX TIME IN MINUTES BETWEEN PROFILES IS 60
NEW MAX TIME?
MAX DISTANCE IN KM BETWEEN PROFILES IS 10.00000
NEW MAX DISTANCE?
CHANGE TEMP AND/OR SAL LIMITS AT DEPTH? DEFAULT IS NO
NEW DEPTH FOR CHANGING TEMP/SAL LIMITS? DEFAULT IS 6500.000
ENTER NEW TEMPERATURE/SALINITY LIMITS
MINIMUM TEMPERATURE (DEG C) ALLOWED IS -2.500000
NEW MINIMUM TEMPERATURE?
MAXIMUM TEMPERATURE (DEG C) ALLOWED IS 12.00000
NEW MAXIMUM TEMPERATURE?
MINIMUM SALINITY ALLOWED IS 34.00000
NEW MINIMUM SALINITY?
MAXIMUM SALINITY ALLOWED IS 37.00000
NEW MAXIMUM SALINITY?

Appendix B: MOODS on a micro or personal computer

APPENDIX B

MOODS ON A MICRO- OR PERSONAL COMPUTER

A micro- or personal computer presents two difficulties for MOODS: data storage is limited and much of the existing MOODS software is not adaptable to microcomputer usage. However, these problems are not insurmountable.

The following system requirements will implement MOODS on a microcomputer.

- o The system must be user friendly.
- o The system should require a minimum of maintenance.
- o The system must be flexible, easy to use in new ways, and easily adaptable to new requirements.
- o The system should be as machine independent as possible. All software should be written in machine-independent languages, such as FORTRAN 77, wherever possible and should be reasonably portable to other systems. Portability problems are most likely to occur in the input/output (I/O) area. Structured programs with I/O isolated to one or a few subroutines are easier to convert to other systems than programs with I/O statements embedded throughout.

MOODS presently contains approximately 3.5 million profiles and is growing yearly. Estimating about 100 data words (4 bytes/word) per profile, MOODS now contains about 1.4 gigabytes of data. If 25% of the data is removed through the editor, about one gigabyte of data still remains. For a double-sided, double-density, removable floppy disk with a storage capacity of about 1 megabyte, about 1000 floppy disks would be required to hold the present MOODS. For a Winchester drive with 100 megabytes of hard disk storage, 10 hard disks would be required to hold the present MOODS. Optical disks, which are just now coming onto the market, offer the extremely high storage density of 1 gigabyte on a single 12-inch platter. One optical disk could hold the present MOODS. Magnetic tape, which tends to be used for backup rather than primary storage, is not practical because of slow random access.

Maintaining the entire MOODS on floppy disks is impractical. A possible mechanism for reducing the size of MOODS is the subsetting of the data set. Subsets of MOODS can be defined by region, season, source, and depth. These subsets of MOODS could then be loaded onto floppy disks for particular applications. Even larger subsets of MOODS could be loaded onto hard disks, but then the ruggedness, cheapness, and simplicity of floppy disk systems are lost (a dedicated Winchester drive and a magnetic tape drive for backup of the Winchester disk are required). Optical disk technology is not yet sufficiently developed and proven. Furthermore, MOODS is growing rapidly; thus, the storage requirements increase.

Another mechanism for reducing the size of MOODS to a manageable quantity for microcomputer applications involves thinning the data set, that is, to reduce the number of profiles in highly sampled regions to several representative profiles. Floppy disks are then practical. Biasing the data by the highly sampled areas would also be reduced through thinning. Data sets could be thinned for the particular applications. The data base editor described in this report can be

used for thinning profiles by setting the parameters for the duplicate profile check accordingly.

Software for manipulating MOODS is available at the Fleet Numerical Oceanography Center for a CDC computer (Bauer, 1981), at the Naval Oceanographic Office for a UNIVAC computer (Bauer, 1983), and at the John Hopkins University Applied Physics Laboratory for a VAX computer (Kassoff, 1983). The CDC programs tend to be large and complex due to their batch processing environment. The UNIVAC programs are similar, since they tend to be converted CDC or similarly designed programs. Modifying these programs should be quite difficult and often impossible because of their complexity and machine dependence. Entirely different programs were written for the VAX but similar problems can be anticipated.

Existing micro/personal computer data-base systems need to be identified for which MOODS applications can be designed to properly fit and to take advantage of their data-base capabilities and facilities. Either actual or interpolated data values for all products (where applicable) must be provided by the system. Useful products that should be available from the microcomputer MOODS follow.

- Profile plots
- TS plots
- Data listings
- Minimums, maximums, means, and standard deviations for data values
- Data distributions
- Waterfall plots
- Composite profile plots
- Computed sound velocity profiles
- Mean profiles
- Vertical cross sections
- Horizontal cross sections
- Dynamic heights/geostrophic currents
- Inversion/strength mapping
- Mixed layer depth/strength mapping
- Acoustic duct depth/strength mapping

Appendix C: Program listings

APPENDIX C

PROGRAM LISTINGS

```
C*****  
C PROGRAM: MOODSED  
C PURPOSE: TO EDIT OUTPUT OF MOODS DATA BASE  
C  
C This program takes output from the MOODGET routine and removes  
C the bad or questionable profiles; this output is in the same  
C format as the output from the MOODGET routine. The output is  
C readable with the text editor. A summary of which profiles  
C are removed is given in "INPUTFILENAME.LOG".  
C  
C NOTE: If another data access routine is substituted  
C for MOODGET, then subroutines RDMOOD and WEMOOD must be  
C changed accordingly.  
C  
C UNIVAC: SUBROUTINES CALLED: LNDCHK  
C RDIN  
C DEPTHC  
C VALUEC  
C INVERC  
C RDMOOD  
C WEMOOD  
C SOLIC  
C STATS  
C NODAYS  
C DUPGET  
C GMLIC  
C SORT  
C DB2DEP  
C  
C VAX: LANDMASK is substituted for LNDCHK.  
C There is no bottom checking routine (DE2DEP).  
C  
C UNIVAC map element: MAPMOODSED  
C VAX link element: MOODSED.LNK  
C  
C UNIVAC sample run: RUNMOODSED  
C VAX sample run: MOODSED.RUN  
C  
C Sample input MOODS data, UNIVAC: .MOODAT  
C Convert program element to SDF file.  
C @ASG,UP DATA.  
C @DATA,I DATA.  
C @ADD,D DATA.  
C @END  
C  
C Sample input data, VAX: MOODAT.DAT  
C  
C INPUT: INSTRUCTION FILE FORMAT  
C IFIL input filename (default [BILL.MOODS]MOODS)
```

C OFIL output filename (def MOODS)
C TMIN minimum temperature allowed (def -2.5)
C TMAX maximum temperature allowed (def 32.0)
C SMIN minimum salinity allowed (def 32.0)
C SMAX maximum salinity allowed (def 40.0)
C TL01 minimum temperature allowed past ZMIN (def -2.5)
C THI1 maximum temperature allowed past ZMIN (def 12.0)
C SLO1 minimum salinity allowed past ZMIN (def 34.0)
C SHI1 maximum salinity allowed past ZMIN (def 36.0)
C ZMIN depth at which to change limits, TL01, etc. (def 1000.)
C ZMAX maximum depth allowed (def 6500.0)
C LCHK set to 1 to skip land checking (def 0)
C IDCK set to 1 to skip neg. and non-mon. depth checks (def 0)
C IECK set to 1 to skip MOODS dup profile error code checking (def 0)
C IBCK set to 1 to skip depth thru bottom checking (def 0)
C ITOC set to 1 to skip checking for all-zero temps (def 0)
C ISOC set to 1 to skip checking for all-zero salinities (def 0)
C ISBC set to 1 to skip checking for bad salinities (def 0)
C ITBC set to 1 to skip checking for bad temperatures (def 0)
C IVCK set to 1 to skip checking for density/temp inversions
(def 0)
C ZIVC check for inversions beyond this depth (def 0.0)
C DTOL tolerance for density inversion check (def 0.00001)
C TTOL tolerance for temperature inversion check (def 1.0)
C BTOL through bottom depth check tolerance, % (def 1.0 %)
C IMIS set to 1 to skip checking for misplaced profiles (def 0)
C DMIS max depth of near SST for misplaced profile check (def 20.0)
C STOL standard dev. tolerance for misplaced prof check (def 3.5)
C IDUP set to 1 to skip dup. prof. check (time-dist. window) (def 0)
C IMIN time window in minutes for dup. prof check (def 30)
C DIST distance window in km for dup. prof check (def 5.0)
C C comment statement, no action.
C QEND ends instructions and begins program execution (UNIVAC)
C Z "CTRL Z" ends instructions and begins program execution (VAX)

C HELP program solicits input

C EXAMPLE RUN WITH INSTRUCTION FILE INPUT:

```
$ RUN [BILL.MOODS]MOODSED
C   DEFINE INPUT FILENAME
C     IFIL MOODS.DAT
C   DEFINE OUTPUT FILENAME
C     OFIL OUTFILE.DAT
C   IGNORE ALL ZERO SALINITIES
C     ISOC 1
C   SKIP LAND CHECKING
C     LCHK 1
C
```

C ****

C THIS PROGRAM CAN HANDLE A MAXIMUM OF IPMAX PROFILES, WITH A MAXIMUM
C OF LEVMAX LEVELS FOR EACH PROFILE.

```

C      PARAMETER (IPMAX=99000,LEVMAX=1000)
C
C      CHARACTER*13 GL1,GL2
C      CHARACTER*72 OUTFILE,INFILE,LOGFILE
C      CHARACTER*131 INPUT,INPUTS
C      CHARACTER*10 IP
C
C      COMMON /VALIM /TMIN,TMAX,SMIN,SMAX,TEMP,SAL,
C      &          TL01,THI1,SL01,SHI1,ZMIN
C      COMMON /FILES/ INFILE,OUTFILE
C      COMMON /CHKS/ LCHK, IDCK, ITOC, ISOC, ISBC, ITBC, IVCK, ZIVC, IECK, IBCK,
C      &          IMIS, DMIS, STOL, IDUP, IMIN, DIST
C      COMMON /ZLIM/ ZMAX, ZVAL
C      COMMON /INVERT/ DTOL, TTOL, BTOL, DELDEN, DELT
C      COMMON /RDCOM/ F(10), ID(10), TOP, BOT, IS
C      COMMON /RDCOMA/ INPUTS, GL1, GL2, IP
C
C      DIMENSION D(LEVMAX), T(LEVMAX), S(LEVMAX)
C      DIMENSION IPCT(12), ISCODE(30), INVFLG(2), ISCODG(30)
C      DIMENSION TIME(IPMAX), INO(IPMAX), IDUPER(IPMAX)
C
C      EQUIVALENCE (IDUPER,TIME)
C
C      DATA ITOTCT,IPASS, IDCT/0,1,1/
C*****
C      READ INPUT
C
C      SAVE MAX NO. OF LEVELS FOR CHECK IN RDMOOD
C      MAXLEV=LEVMAX
C
C      WRITE(6,*)' ENTER INSTRUCTIONS OR --'
C      WRITE(6,*)' TYPE "HELP" FOR INPUT SOLICITATION'
C
C      READ INPUT INSTRUCTIONS FROM INSTRUCTION FILE
C      CALL RDIN(ISOL)
C
C
C      SOLICITATE INPUT
C      IF(ISOL.EQ.1)CALL SOLIC
C*****
C      OPEN FILES
C      OPEN(UNIT=24,ACCESS='DIRECT',FORM='UNFORMATTED',
C      & STATUS='SCRATCH',ERR=9089,RECL=3)
C      OPEN(UNIT=26,STATUS='SCRATCH',ERR=9091)
C      OPEN(UNIT=27,FILE=INFILE,STATUS='OLD',READONLY,ERR=9092)
C      OPEN(UNIT=21,FILE=OUTFILE,STATUS='NEW',ERR=9093)
C
C      K=72
C      DO 10 I=1,72
C      IF(INFILE(K:I).NE.' ')GO TO 11
10      K=K-1
11      CONTINUE

```



```

CCC
C   APPLY CHECK FOR MISPLACED PROFILES.
15      IF(IMIS.EQ.0)THEN
CCC
IF(D(1).GT.DMIS)GO TO 16
IF(T(1).LT.-998.)GO TO 16
C
C   THROW OUT MISPLACED PROFILES
IF(T(1).GT.SSTMAX.OR.T(1).LT.SSTMIN)THEN
  WRITE(29,*)'MISPL. PROF., SST= ',T(1),' ',GL1,GL2,
&   ' PROF ',IS
  IPCT(11)=IPCT(11)+1
  GO TO 1
END IF
CCC
END IF
CCC
C*****
C   THROW OUT DUPLICATE PROFILES
C   IF NO MORE DUP. PROFILES SKIP FOLLOWING
16      IF(IDUPCT.EQ.0)GO TO 19
      IF(IDCT.GT.IDUPCT)GO TO 19
C
IF(IDUP.EQ.0)THEN
C   PROFILE MAY HAVE BEEN REMOVED ALREADY BY MISPLACED PROF TEST
  IF(IDUPER(IDCT).LT.IS)THEN
    IDCT=IDCT+1
    IF(IDCT.GT.IDUPCT)GO TO 19
  END IF
C
  IF(IDUPER(IDCT).EQ.IS)THEN
    IDCT=IDCT+1
    WRITE(29,*)'DUPLICATE PROFILE ',GL1,GL2,' PROF ',IS
    IPCT(12)=IPCT(12)+1
    GO TO 1
  END IF
CC
END IF
CC
C
C   WRITE DATA ON SECOND PASS
19      CALL WEMOOD(D,T,S,NLEV,IEOF)
      IF(IEOF.EQ.2)GO TO 9004
      GO TO 2
C*****
C   COUNT TOTAL NO. OF PROFILES
20      ITOTCT=ITOTCT+1
C   DO NOT ALLOW MORE THAN IPMAX PROFILES
      IF(ITOTCT.GT.IPMAX)THEN
        WRITE(6,*)'MAX NO. OF PROFILES PROCESSED - ',IPMAX
        WRITE(29,*)'MAX NO. OF PROFILES PROCESSED - ',IPMAX
        GO TO 900

```

```

END IF
C*****
C
C*****
C  CHECK MOODS ERR CODE FOR DUPLICATE PROFILES.
C  IF NON-ZERO THEN SKIP PROFILE
  IF(IECK.EQ.1)GO TO 30
  IF(ID(5).NE.0.OR.ID(6).NE.0)THEN
    WRITE(29,*)"NON-ZERO MOODS ERR CODE ',GL1,GL2,' PROF',IS
    IPCT(1)=IPCT(1)+1
    GO TO 1
  END IF
  30 CONTINUE
C*****
C
C*****
C  CHECK FOR DATA OVER LAND, IF SO, THEN SKIP PROFILE
C  IX5=0 FOR WATER,IX5=1 FOR LAND
  IF(LCHK.EQ.1)GO TO 40
C
C  LAND CHECKING IN NOT AVAILABLE BEYOND 72N AND 72S.
  IF(ABS(F(1)).GT.72.0)THEN
    WRITE(6,*)" LAND CHECKING IS NOT AVAILABLE BEYOND 72N AND 72S'
    GO TO 40
  END IF
C
  IX1=F(1)
  IX2=(F(1)-IX1)*60.
  IX3=F(2)
  IX4=(F(2)-IX3)*60.
  CALL LANDMASK(IX1,IX2,IX3,IX4,IX5)
  IF(IX5.EQ.1)THEN
    IPCT(2)=IPCT(2)+1
    WRITE(29,*)"DATA OVER LAND ',GL1,GL2,' PROF ',IS
    GO TO 1
  END IF
  40 CONTINUE
C
C*****
C
C*****
C  CHECK DEPTHS FOR NEGATIVE DEPTHS, NON-MONOTONIC DEPTHS,
C  AND DEPTHS EXCEEDING MAX DEPTH.
C  FIX NEGATIVE AND NON-MONOTONIC DEPTHS, THROW OUT PROFILES
C  IF MAX DEPTH IS EXCEEDED.
C
  IF(IDCK.EQ.1)GO TO 50
  CALL DEPTHC(D,T,S,NLEV,IZFLG,IDFLG)
C
C  IF IDFLG=0 THEN DEPTHS ARE OK, 1 FOR NEG. DEPTHS, 2 FOR NON-MON.
C  IZFLG=1 THEN MAX DEPTH EXCEEDED THROW THESE PROFILES OUT
  IF(IDFLG.GT.0)THEN
    IF(IDFLG.EQ.1)WRITE(29,*)"NEG. DEPTHS ENCOUNTERED, ASSUMED POS.'
```

```

* ,GL1,GL2,' PROF ',IS
IF(IDFLG.EQ.2)WRITE(29,*)'NON-MON. DEPTHS FOUND, '
* 'MADE MON. ',GL1,GL2,' PROF ',IS
IF(IDFLG.EQ.3)WRITE(29,*)'NEG. AND NON-MON. DEPTHS FOUND '
* , ' FIXED ',GL1,GL2,' PROF ',IS
END IF
IF(IZFLG.EQ.1)THEN
  WRITE(29,*)'MAX DEPTH EXCEEDED, PROFILE REMOVED, Z= ',
* ZVAL,GL1,GL2,' PROF ',IS
  IPCT(3)=IPCT(3)+1
  GO TO 1
END IF
50  CONTINUE
C*****
C*****
C***** CHECK FOR DEPTHS EXCEEDING BOTTOM DEPTH (TOLERANCE OF BTOL %)
C  IF SO, THROW PROFILE OUT.
C  SYNBAPS DATA BASE IS USED.
  IF(IBCK.EQ.1)GO TO 55
CW
  WRITE(6,*) ' BOTTOM CHECKING NOT AVAILABLE ON VAX'
  IBCK=1
  IF(IBCK.EQ.1)GO TO 55
CW
  X1=F(1)
  X3=F(2)
C  CALL DEPTH(X1,X3,BDEPTH)
  BDP=BDEPTH+(BDEPTH*BTOL*.01)
  DO 52 I=1,NLEV
  IF(D(I).GT.BDP)THEN
    WRITE(29,*)'BOTTOM/DEPTH',BDEPTH,'/',D(I),GL1,GL2,' PROF ',IS
    IPCT(4)=IPCT(4)+1
    GO TO 1
  END IF
52  CONTINUE
C*****
C*****
C***** CHECK FOR IMPOSSIBLE T VALUES AND IMPOSSIBLE S VALUES
C  IF PROFILE HAS A SINGLE BAD VALUE, THROW PROFILE OUT
55  CALL VALUEC(D,T,S,NLEV,IVFLG)
C  IF IVFLG=0 THEN DATA ARE OK, 1 FOR SAL ARE ALL ZERO,
C  2 FOR TEMP ARE ALL ZERO, 3 FOR TEMP AND SAL ARE ALL ZERO,
C  4 FOR BAD TEMP VALUE, 5 FOR BAD SAL VALUE, 6 FOR BAD TEMP AND SAL VAL,
C  7 FOR BAD SAL VALUE AND TEMP ARE ALL ZERO,
C  8 FOR BAD TEMP VALUE AND SAL ARE ALL ZERO
C
C  THROW OUT PROFILE IF BAD TEMP AND ITBC=0
C  KEEP BAD TEMP IF ITBC=1
  IF(ITBC.EQ.1)GO TO 60
  IF(IVFLG.EQ.4.OR.IVFLG.EQ.6.OR.IVFLG.EQ.8)THEN
    IPCT(5)=IPCT(5)+1

```

```

        * WRITE(29,*)'BAD TEMP VALUE OF ',TEMP,' ',GL1,GL2
        * , ' PROF ',IS
        GO TO 1
        END IF
60    CONTINUE
C   THROW OUT PROFILE IF BAD SAL AND ISBC=0
C   KEEP BAD SAL IF ISBC=1
    IF(ISBC.EQ.1)GO TO 62
    IF(IVFLG.EQ.5.OR.IVFLG.EQ.6.OR.IVFLG.EQ.7)THEN
    IPCT(6)=IPCT(6)+1
    WRITE(29,*)'BAD SAL VALUE OF ',SAL,' ',GL1,GL2
    * , ' PROF ',IS
    GO TO 1
    END IF
62    CONTINUE
C   CHANGE SALINITIES TO MISSING (-999) WHEN SALINITIES
C   ARE ALL 0 IF ISOC=0.  KEEP IF ISOC=1
    IF(ISOC.EQ.1)GO TO 64
    IF(IVFLG.EQ.1.OR.IVFLG.EQ.8)THEN
    IPCT(7)=IPCT(7)+1
    WRITE(29,*)'SALINITIES ARE ALL ZERO ',GL1,GL2
    * , ' PROF ',IS
    END IF
64    CONTINUE
C   THROW OUT PROFILE WHEN TEMPERATURES ARE ALL 0 IF ITOC=0
C   KEEP IF ITOC=1
    IF(ITOC.EQ.1)GO TO 66
    IF(IVFLG.EQ.2.OR.IVFLG.EQ.7)THEN
    IPCT(8)=IPCT(8)+1
    WRITE(29,*)'TEMPERATURES ARE ALL ZERO ',GL1,GL2
    * , ' PROF ',IS
    GO TO 1
    END IF
66    CONTINUE
C
C***** *****
C
C***** *****
C   CHECK FOR DENSITY INVERSIONS (TOLERANCE DENTOL) IF SALINITY IS
C   PRESENT, OTHERWISE CHECK FOR TEMPERATURE INVERSIONS (TOLERANCE TTOL)
C   THROW PROFILES OUT IF TOLERANCE IS EXCEEDED.
C   INVFLG(1)=1 FOR DENSITY INVERSION, INVFLG(2)=1 FOR TEMP INVERSION.
    IF(IVCK.EQ.1)GO TO 70
    ZIVC1=ZIVC
    CALL INVERC(D,T,S,NLEV,ZIVC1,INVFLG)
C
C   IF INVFLG(1 OR 2)=0 THEN NO INVERSIONS EXCEEDING TOLERANCE.
C   IF DENSITY INVERSION, OR TEMPERATURE INVERSION - THEN
C   THROW THESE PROFILES OUT.
    IF(INVFLG(1).GT.0.OR.INVFLG(2).GT.0)THEN
      IF(INVFLG(1).EQ.1)IPCT(9)=IPCT(9)+1
      IF(INVFLG(1).EQ.1)WRITE(29,*)'DENSITY INVERSION-',DELDEN,' ',GL1
      * ,GL2,' PROF ',IS
      IF(INVFLG(2).EQ.1)IPCT(10)=IPCT(10)+1

```

```

        IF(INVFLG(2).EQ.1)WRITE(29,*)"TEMP INVERSION-',DELT,' ',GL1,GL2,
*   ' PROF',IS
      GO TO 1
    END IF
70  CONTINUE
*****
C*****
C***** CHECK FOR MISPLACED PROFILES (FIRST PASS COMPUTATIONS)
C***** CALCULATE MEAN AND STANDARD DEVIATION OF THE NEAR SST FOR EXTRACTED
C***** DATA SET. NEAR SST IS THE TEMPERATURE AT DEPTHS LESS THAN DMIS.
C***** IF THE SST IS GREATER THAN STOL STANDARD DEVIATIONS FROM THE MEAN,
C***** ASSUME THE PROFILE IS MISPLACED AND REMOVE THE PROFILE.
C***** THIS TEST REQUIRES A PASS THROUGH THE CLEANED DATA.
      IF(IMIS.EQ.1)GO TO 74
      ISF=0
      IF(D(1).GT.DMIS)THEN
        WRITE(29,*)"PROFILE ',IS,'STARTS TOO DEEP FOR MISPL. PROF. TEST'
        GO TO 74
      END IF
      DAT=T(1)
C     UPDATE STATS
      CALL STATS(ISF,DAT,VMEAN,VSDEV,NNUM)
74  CONTINUE
*****
C*****
C***** DUPLICATE PROFILE COMPUTATIONS (PASS 1)
C***** CHECK FOR DUPLICATE PROFILES BY APPLICATION OF A TIME-DISTANCE
C***** WINDOW ON THE SECOND PASS THROUGH THE DATA
C***** SORT ON TIME AND THEN CHECK DISTANCE BETWEEN PROFILES WITHIN
C***** THE TIME WINDOW. SAVE TIME, LAT, LONG, PROFILE NO. AND NO. OF
C***** DATA LEVELS PER PROFILE ON FIRST PASS.
      IF(IDUP.EQ.1)GO TO 78
C     COUNT NO. OF PROFILES FOR DUP TEST
      KK=KK+1
C     SAVE PROFILE NO.
      INO(KK)=IS
C     GET JULIAN DAY
      READ(GL1(1:4),5700)IYR
5700 FORMAT(I4)
      READ(GL1(5:6),5701)IMON
5701 FORMAT(I2)
      READ(GL1(7:8),5701>IDAY
      READ(GL1(10:11),5701>IHR
      READ(GL1(12:13),5701)IMN
      CALL NODAYS(IYR,IMON>IDAY,NDYM,NDY,IERR)
C
      IF(IERR.GT.0)THEN
        WRITE(26,*)"BAD TIME FOR PROFILE NO. ',IS,'IYR=',IYR,
& 'IMON=',IMON,'IDAY=',IDAY
        TIME(KK)=-999.
        GO TO 77
      END IF

```

```

C
C   CHECK FOR LEAP YEARS
    IDYYR=365
    IF(MOD(IYR,4).EQ.0)IDYYR=366
GET DECIMAL YEAR TIME
    RHRYR=IDYYR*24.
    RMINYR=RHRYR*60.
    RHR=FLOAT(IHR)
    RMIN=FLOAT(IMN)
    RYR=FLOAT(IYR)
    RDY=FLOAT(NDY)
    RDYYR=FLOAT(IDYYR)
    TIME(KK)=(RYR-1900)+(RDY/RDYYR)+(RHR/RHRYR)+(RMIN/RMINYR)
C   SAVE LAT, LONG, AND NO. OF LEVELS PER PROFILE
    77  WRITE(24'IS,ERR=9088)F(1),F(2),NLEV
    78  CONTINUE
C*****
C
C***** WRITE EDITED MOODS OUTPUT FILE
C   SKIP WRITE ON FIRST PASS IF MISPLACED OR DUP. PROFILE CHECK IS ON
    IF(IMIS.EQ.0.OR.IDUP.EQ.0)GO TO 3
    CALL WEMOOD(D,T,S,NLEV,IEOF)
C
    IF(IEOF.EQ.2)GO TO 9004
C
    GO TO 2
C*****
9000 IF(IPASS.EQ.1)WRITE(6,*)'ERROR IN READING INPUT MOODS DATA '
900  IF(IPASS.EQ.2)GO TO 98
C
C   FINALIZE STATS AND GET PARAMETERS FOR MISPLACED PROF AT END OF PASS 1
    IF(IMIS.EQ.0)THEN
        ISF=1
        CALL STATS(ISF,DAT,VMEAN,VSDEV,NNUM)
C   SET LIMITS FOR STANDARD DEVIATION CHECK
        SSTMIN=VMEAN-STOL*VSDEV
        SSTMAX=VMEAN+STOL*VSDEV
        REWIND 26
        REWIND 27
C   READ FIRST BAD PROFILE NO.
        READ(26,*,END=90,ERR=90)IBADNO
        GO TO 95
C   SET FLAG TO SIGNIFY NO BAD PROFILES
90    IBEOF=1
        END IF
C
C***** FIND DUPLICATE PROFILES ON END OF PASS 1
95    IF(IDUP.EQ.0)THEN
C   SORT PROFILES IN TIME
        CALL SORT(TIME,INO,KK)

```

```

DELTIM=IMIN/RMINYR
CALL DUPGET(TIME,INO,KK,DELTIM,DIST,IDUPER,IDUPCT)
REWIND 26
REWIND 27
C READ FIRST BAD PROFILE NO.
READ(26,*END=96,ERR=96)IBADNO
GO TO 97
C SET FLAG TO SIGNIFY NO BAD PROFILES
96   IBEEOF=1
      END IF
C
C MAKE SECOND PASS IF DUP OR MISPL. PROF CHECK IS ON
97   IF(IMIS.EQ.0.OR.IDUP.EQ.0)THEN
      IPASS=2
      GO TO 3
      END IF
C*****
C*****
C*****
98   WRITE(6,*)' '
      WRITE(6,*)"EDIT PARAMETERS"
      WRITE(6,*)"MIN TEMPERATURE (DEG C)"      ',TMIN
      WRITE(6,*)"MAX TEMPERATURE (DEG C)"      ',TMAX
      WRITE(6,*)"MIN SALINITY"                  ',SMIN
      WRITE(6,*)"MAX SALINITY"                  ',SMAX
      WRITE(6,*)
      WRITE(6,*)"TEMP/SAL LIMITS PAST DEPTH (M)"  ',ZMIN
      WRITE(6,*)"MIN TEMPERATURE (DEG C)"      ',TL01
      WRITE(6,*)"MAX TEMPERATURE (DEG C)"      ',THI1
      WRITE(6,*)"MIN SALINITY"                  ',SL01
      WRITE(6,*)"MAX SALINITY"                  ',SHI1
      WRITE(6,*)
      WRITE(6,*)"MAX DEPTH (M)"                 ',ZMAX
      WRITE(6,*)"BOTTOM DEPTH TOLERANCE"        ',BTOL,'%'
      WRITE(6,*)"MAX DENSITY INVERSION (GM/CM**3)"  ',DTOL
      WRITE(6,*)"MAX TEMP. INVERSION (DEG C)"    ',TTOL
      WRITE(6,*)"INVERSIONS CHECKED AT DEPTHS GREATER THAN ",ZIVC," M"
      IF(IMIS.EQ.0)WRITE(6,*)"MISPL. PROF. CHECK: MEAN SST (DEG C) ",
      & VMEAN,' ST. DEV.= ',VSDEV
      IF(IDUP.EQ.0)WRITE(6,*)"DUP. PROF. CHECK: TIME DIFF (MIN) "
      & ,IMIN,' DIST. DIFF (KM) ',DIST
      WRITE(6,*)

C
      WRITE(29,*)' '
      WRITE(29,*)"EDIT PARAMETERS"
      WRITE(29,*)"MIN TEMPERATURE (DEG C)"      ',TMIN
      WRITE(29,*)"MAX TEMPERATURE (DEG C)"      ',TMAX
      WRITE(29,*)"MIN SALINITY"                  ',SMIN
      WRITE(29,*)"MAX SALINITY"                  ',SMAX
      WRITE(29,*)
      WRITE(29,*)"TEMP/SAL LIMITS PAST DEPTH (M)"  ',ZMIN
      WRITE(29,*)"MIN TEMPERATURE (DEG C)"      ',TL01
      WRITE(29,*)"MAX TEMPERATURE (DEG C)"      ',THI1
      WRITE(29,*)"MIN SALINITY"                  ',SL01

```

```

      WRITE(29,*)'MAX SALINITY           ',SHI1
      WRITE(29,*)'
      WRITE(29,*)'MAX DEPTH (M)          ',ZMAX
      WRITE(29,*)'BOTTOM DEPTH TOLERANCE   ',BTOL,'%'
      WRITE(29,*)'MAX DENSITY INVERSION (GM/CM**3) ',DTOL
      WRITE(29,*)'MAX TEMP. INVERSION (DEG C)  ',TTOL
      WRITE(29,*)'INVERSIONS CHECKED AT DEPTHS GREATER THAN ',ZIVC,' M'
      IF(IMIS.EQ.0)WRITE(29,*)'MISPL. PROF. CHECK: MEAN SST (DEG C) ',
      & VMEAN,' ST. DEV.= ',VSDEV
      IF(IDUP.EQ.0)WRITE(29,*)'DUP. PROF. CHECK: TIME DIFF (MIN) '
      & ,IMIN,' DIST. DIFF (KM) ',DIST
      WRITE(29,*)

C
      DO 100 I=1,12
 100  IPCT1=IPCT(I)+IPCT1
C
C   SALINITIES ALL ZERO WERE CHANGED TO MISSING, PROF. KEPT
      IPCT1=IPCT1-IPCT(7)
      PC=100.*FLOAT(IPCT1)/FLOAT(ITOTCT)
C
      WRITE(6,*)'TOTAL NO. OF PROFILES PROCESSED ',ITOTCT
      WRITE(6,*)'NO. OF PROFILES REJECTED     ',IPCT1,' ',PC,'%'
      WRITE(6,*)'
      WRITE(6,*)'SUMMARY OF PROFILE REJECTION CAUSES'

C
      WRITE(29,*)'TOTAL NO. OF PROFILES PROCESSED ',ITOTCT
      WRITE(29,*)'NO. OF PROFILES REJECTED     ',IPCT1,' ',PC,'%'
      WRITE(29,*)'
      WRITE(29,*)'SUMMARY OF PROFILE REJECTION CAUSES'

C
      IF(IECK.EQ.0)THEN
        PC=100.*FLOAT(IPCT(1))/FLOAT(ITOTCT)
        WRITE(6,*)'MOODS ERR CODE, DUPLICATES: ',IPCT(1),' ',PC,'%'
        WRITE(29,*)'MOODS ERR CODE, DUPLICATES: ',IPCT(1),' ',PC,'%'
      END IF
      IF(LCHK.EQ.0)THEN
        PC=100.*FLOAT(IPCT(2))/FLOAT(ITOTCT)
        WRITE(6,*)'DATA OVERLAND:           ',IPCT(2),' ',PC,'%'
        WRITE(29,*)'DATA OVERLAND:           ',IPCT(2),' ',PC,'%'
      END IF
      PC=100.*FLOAT(IPCT(3))/FLOAT(ITOTCT)
      WRITE(6,*)'MAX DEPTH EXCEEDED:       ',IPCT(3),' ',PC,'%'
      WRITE(29,*)'MAX DEPTH EXCEEDED:       ',IPCT(3),' ',PC,'%'
      IF(IBCK.EQ.0)THEN
        PC=100.*FLOAT(IPCT(4))/FLOAT(ITOTCT)
        WRITE(6,*)'BOTTOM DEPTH EXCEEDED:    ',IPCT(4),' ',PC,'%'
        WRITE(29,*)'BOTTOM DEPTH EXCEEDED:    ',IPCT(4),' ',PC,'%'
      END IF
      IF(ITBC.EQ.0)THEN
        PC=100.*FLOAT(IPCT(5))/FLOAT(ITOTCT)
        WRITE(6,*)'BAD TEMPERATURE:          ',IPCT(5),' ',PC,'%'
        WRITE(29,*)'BAD TEMPERATURE:          ',IPCT(5),' ',PC,'%'
      END IF
      IF(ISBC.EQ.0)THEN

```

```

PC=100.*FLOAT(IPCT(6))/FLOAT(ITOTCT)          ',IPCT(6),',PC,'%'
WRITE(6,*)'BAD SALINITY:                      ',IPCT(6),',PC,'%'
WRITE(29,*)'BAD SALINITY:                      '
END IF
IF(ISOC.EQ.0)THEN
  PC=100.*FLOAT(IPCT(7))/FLOAT(ITOTCT)
  WRITE(6,*)'SALINITIES ALL ZERO:                ',IPCT(7),',PC,'%
  WRITE(29,*)'SALINITIES ALL ZERO:                ',IPCT(7),',PC,'%
END IF
IF(ITOC.EQ.0)THEN
  PC=100.*FLOAT(IPCT(8))/FLOAT(ITOTCT)
  WRITE(6,*)'TEMPERATURES ALL ZERO:                 ',IPCT(8),',PC,'%
  WRITE(29,*)'TEMPERATURES ALL ZERO:                 ',IPCT(8),',PC,'%
END IF
IF(IVCK.EQ.0)THEN
  PC=100.*FLOAT(IPCT(9))/FLOAT(ITOTCT)
  WRITE(6,*)'DENSITY INVERSION:                     ',IPCT(9),',PC,'%
  WRITE(29,*)'DENSITY INVERSION:                     ',IPCT(9),',PC,'%
  PC=100.*FLOAT(IPCT(10))/FLOAT(ITOTCT)
  WRITE(6,*)'TEMPERATURE INVERSION:                  ',IPCT(10),',PC,'%
  WRITE(29,*)'TEMPERATURE INVERSION:                  ',IPCT(10),',PC,'%
END IF
C
IF(IMIS.EQ.0)THEN
  PC=100.*FLOAT(IPCT(11))/FLOAT(ITOTCT)
  WRITE(6,*)'MISPLACED PROFILES:                    ',IPCT(11),',PC,'%
  WRITE(29,*)'MISPLACED PROFILES:                    ',IPCT(11),',PC,'%
END IF
C
IF(IDUP.EQ.0)THEN
  PC=100.*FLOAT(IPCT(12))/FLOAT(ITOTCT)
  WRITE(6,*)'DUPLICATE PROFILES:                   ',IPCT(12),',PC,'%
  WRITE(29,*)'DUPLICATE PROFILES:                   ',IPCT(12),',PC,'%
END IF
C
WRITE(6,*)
WRITE(6,*)'PROFILE SUMMARY BY SOURCE CODE'
WRITE(29,*)
WRITE(29,*)'PROFILE SUMMARY BY SOURCE CODE'
WRITE(6,*)'      SOURCE CODE',' PROFILES REMOVED',
& '      PROFILES RETAINED'
WRITE(29,*)'      SOURCE CODE',' PROFILES REMOVED',
& '      PROFILES RETAINED'
DO 102 I=1,23
  WRITE(6,*)I,'      ',ISCODE(I),'      ',ISCODG(I)
  WRITE(29,*)I,'      ',ISCODE(I),'      ',ISCODG(I)
102
C
WRITE(6,*)'END OF JOB'
STOP
9004 WRITE(6,*)'ERROR IN WRITING OUTPUT EDITED MOODS DATA'
STOP
9088 WRITE(6,*)'ERROR IN WRITING FILE 24'
STOP

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```
9089 WRITE(6,*)"ERROR IN READING FILE 24'  
      STOP  
9090 WRITE(6,*)"ERROR IN READING FILE 26'  
      STOP  
9091 WRITE(6,*)"ERROR IN OPENING SCRATCH FILE 26'  
      STOP  
9092 WRITE(6,*)"ERROR IN OPENING INPUT DATA FILE ',INFILE  
      STOP  
9093 WRITE(6,*)"ERROR IN OPENING OUTPUT DATA FILE ',OUTFILE  
9094 WRITE(6,*)"ERROR IN OPENING LOG FILE ',LOGFILE  
      END
```

SUBROUTINE DB2DEP(Y,X,D)

C THIS ROUTINE IS AVAILABLE ONLY ON THE UNIVAC.
C GIVEN LATITUDE (Y) AND LONGITUDE (X), THIS ROUTINE
C RETURNS DEPTH (D) FROM THE NAVOCEANO DIGITAL BATHY-
C METRIC DATA BASE ((DB)**2). COVERAGE INCLUDES BOTH
C NORTHERN AND SOUTHERN HEMISPHERES FROM APPROXIMATELY
C 81S TO 90N LATITUDE.
C -- ASCII FORTRAN VERSION --

C PARAMETERS:

C Y - LATITUDE IN DEGREES (-90 TO 90)
C X - LONGITUDE IN DEGREES (0 TO 360)
C D - DEPTH IN METERS

C DIMENSION H(4),E(1861),ISQ(2448)
C INTEGER E

C

DATA(ISQ(J),J=1,195)/

* 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
* 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
* 0, 0, 0, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9,
* 10, 11, 12, 13, 14, 15, 16, 0, 0, 0, 0, 0, 0,
* 0, 0, 0, 0, 0, 0, 0, 17, 18, 19, 20, 21, 22,
* 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35,
* 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48,
* 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61,
* 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74,
* 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87,
* 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100,
* 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113,
* 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126,
* 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139,
* 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152/

DATA(ISQ(J),J=196,390)/

* 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165,
* 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178,
* 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191,
* 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204,
* 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217,
* 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230,
* 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243,
* 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256,
* 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269,
* 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282,
* 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295,
* 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308,
* 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321,
* 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334,
* 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347/

DATA(ISQ(J),J=391,585)/

* 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360,
* 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373,

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* 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386,
* 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399,
* 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412,
* 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425,
* 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438,
* 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451,
* 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464,
* 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477,
* 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490,
* 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503,
* 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516,
* 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529,
* 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542/
DATA(ISQ(J),J=586,780)/
* 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555,
* 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568,
* 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581,
* 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594,
* 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607,
* 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620,
* 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633,
* 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646,
* 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659,
* 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672,
* 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685,
* 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698,
* 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711,
* 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724,
* 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737/
DATA(ISQ(J),J=781,975)/
* 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750,
* 751, 752, 753, 0, 0, 754, 755, 756, 757, 758, 759, 760, 761,
* 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774,
* 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787,
* 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800,
* 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813,
* 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 0, 0, 824,
* 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837,
* 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850,
* 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863,
* 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876,
* 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889,
* 890, 891, 892, 893, 0, 0, 894, 895, 896, 897, 898, 899, 900,
* 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913,
* 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926/
DATA(ISQ(J),J=976,1170)/
* 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939,
* 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952,
* 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 0, 0,
* 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976,
* 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989,
* 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1002,
* 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015,
* 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028,

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*1029,1030,1031,1032,1033, 0, 0,1034,1035,1036,1037,1038,1039,
*1040,1041,1042,1043,1044,1045,1046,1047,1048,1049,1050,1051,1052,
*1053,1054,1055,1056,1057,1058,1059,1060,1061,1062,1063,1064,1065,
*1066,1067,1068,1069,1070,1071,1072,1073,1074,1075,1076,1077,1078,
*1079,1080,1081,1082,1083,1084,1085,1086,1087,1088,1089,1090,1091,
*1092,1093,1094,1095,1096,1097,1098,1099,1486,1487,1488,1489, 0,
* 0,1100,1101,1102,1103,1104,1105,1106,1107,1108,1109,1160,1161/
  DATA(ISQ(J),J=1171,1365)/
*1162,1163,1164,1165,1166,1167,1208,1209,1210,1211,1212,1213,1214,
*1215,1256,1257,1258,1259,1260,1261,1262,1263,1304,1305,1306,1307,
*1308,1309,1310,1311,1352,1353,1354,1355,1356,1382,1383,1384,1385,
*1386,1387,1388,1389,1390,1436,1437,1438,1439,1440,1441,1442,1443,
*1484,1485,1492,1493,1494,1495, 0, 0,1110,1111,1112,1113,1114,
*1115,1116,1117,1118,1119,1168,1169,1170,1171,1172,1173,1174,1175,
*1216,1217,1218,1219,1220,1221,1222,1223,1264,1265,1266,1267,1268,
*1269,1270,1271,1312,1313,1314,1315,1316,1317,1318,1319,1357,1358,
*1359,1360,1361,1391,1392,1393,1394,1395,1396,1397,1398,1399,1444,
*1445,1446,1447,1448,1449,1450,1451,1490,1491,1498,1499,1500,1501,
* 0, 0,1120,1121,1122,1123,1124,1125,1126,1127,1128,1129,1176,
*1177,1178,1179,1180,1181,1182,1183,1224,1225,1226,1227,1228,1229,
*1230,1231,1272,1273,1274,1275,1276,1277,1278,1279,1320,1321,1322,
*1323,1324,1325,1326,1327,1362,1363,1364,1365,1366,1400,1401,1402,
*1403,1404,1405,1406,1407,1408,1452,1453,1454,1455,1456,1457,1458/
  DATA(ISQ(J),J=1366,1560)/
*1459,1496,1497,1504,1505,1506,1507, 0, 0,1130,1131,1132,1133,
*1134,1135,1136,1137,1138,1139,1184,1185,1186,1187,1188,1189,1190,
*1191,1232,1233,1234,1235,1236,1237,1238,1239,1280,1281,1282,1283,
*1284,1285,1286,1287,1328,1329,1330,1331,1332,1333,1334,1335,1367,
*1368,1369,1370,1371,1409,1410,1411,1412,1413,1414,1415,1416,1417,
*1460,1461,1462,1463,1464,1465,1466,1467,1502,1503,1510,1511,1512,
*1513, 0, 0,1140,1141,1142,1143,1144,1145,1146,1147,1148,1149,
*1192,1193,1194,1195,1196,1197,1198,1199,1240,1241,1242,1243,1244,
*1245,1246,1247,1288,1289,1290,1291,1292,1293,1294,1295,1336,1337,
*1338,1339,1340,1341,1342,1343,1372,1373,1374,1375,1376,1418,1419,
*1420,1421,1422,1423,1424,1425,1426,1468,1469,1470,1471,1472,1473,
*1474,1475,1508,1509,1516,1517,1518,1519,1716,1717,1150,1151,1152,
*1153,1154,1155,1156,1157,1158,1159,1200,1201,1202,1203,1204,1205,
*1206,1207,1248,1249,1250,1251,1252,1253,1254,1255,1296,1297,1298,
*1299,1300,1301,1302,1303,1344,1345,1346,1347,1348,1349,1350,1351/
  DATA(ISQ(J),J=1561,1755)/
*1377,1378,1379,1380,1381,1427,1428,1429,1430,1431,1432,1433,1434,
*1435,1476,1477,1478,1479,1480,1481,1482,1483,1514,1515,1718,1719,
*1720,1721,1722,1723,1724,1725,1750,1751,1752,1753,1754,1755, 0,
* 0, 0, 0, 0, 0, 0, 0,1520,1521,1522,1532,1533,
*1534,1535,1536,1537,1538,1539,1564,1565,1566,1567,1568,1569,1570,
*1571,1596,1597,1598,1599,1600,1601,1602,1603,1628,1629,1630,1631,
*1632,1633,1652,1653,1654,1655,1656,1657,1658,1659,1684,1685,1686,
*1687,1688,1689,1690,1691,1726,1727,1728,1729,1730,1731,1732,1733,
*1756,1757,1758,1759,1760,1761, 0, 0, 0, 0, 0, 0, 0,
* 0, 0,1523,1524,1525,1540,1541,1542,1543,1544,1545,1546,1547,
*1572,1573,1574,1575,1576,1577,1578,1579,1604,1605,1606,1607,1608,
*1609,1610,1611,1634,1635,1636,1637,1638,1639,1660,1661,1662,1663,
*1664,1665,1666,1667,1692,1693,1694,1695,1696,1697,1698,1699,1734,
*1735,1736,1737,1738,1739,1740,1741,1762,1763,1764,1765,1766,1767,

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*2282,2283,2284,2285,2286,2287,2288,2289,2290,2291,2130,2131,2132,
*2133,2134,2135,2136,2137,2138,2139,2140,2141,2142,2143,2144,2145,
*2146,2147,2148,2149,2150,2151,2152,2153,2154,2155,2156,2157,2158,
*2159,2160,2161,2162,2163,2164,2165,2166,2167,2168,2169,2170,2171,2172,
*2173,2174,2175,2176,2177,2178,2179,2180,2181,2182,2183,2184,2185,
*2186,2187,2188,2189,2190,2191,2192,2193,2194,2195,2196,2197,2198,2199,2200,2201,2238,2239,2240,2241,2242,2243,
*2244,2245,2246,2247,2248,2249,2250,2251,2252,2253,2254,2255,2292,
*2293,2294,2295,2296,2297,2298,2299,2300,2301,2302,2303,2304,2305,
*2306,2307,2308,2309/
C
C      DATA IOP/0/
C
C      IF(IOP.EQ.0)OPEN(UNIT=22,FILE='BATHY*DBDB',ACCESS='DIRECT',
&FORM='UNFORMATTED',STATUS='OLD',ERR=9090,RECL=1865)
      IOP=1
C
C      D=0.
C      XX=X
C      IF(X.EQ.360.)XX=0.
C      C=5./60.
C      C2=C/2.
C
C      IS=(Y+80.)/5.
C      ISN=IS*72+XX/5.+1
C
C      IF(ISN.EQ.ISNO)GO TO 4
C      ISNO=ISN
C      IF(ISN.LT.1)GO TO 9
C      IF(ISN.GT.2448)GO TO 9
C      IRP=ISQ(ISN)
C      IF(IRP.EQ.0)GO TO 9
C
C      READ(22'IRP,ERR=9)H,E
C
C      Y2=H(3)-5.
C      X2=H(4)+5.
C      IF(XX.LT.H(4).OR.XX.GT.X2)GO TO 8
C
C      4 IF(IRP.EQ.0)GO TO 9
C      I=(XX-H(4)+C2)/C+1
C      J=(H(3)-Y+C2)/C+1
C      K=(I-1)*61+J
C      L=(K+1)/2
C
C      IF(MOD(K,2).EQ.0)GO TO 6
C      D=BITS(E(L),1,18)
C      RETURN
C      6 D=BITS(E(L),19,18)
C      RETURN
C      8 WRITE(6,100)Y,X,Y2,H(3),H(4),X2
100 FORMAT(1X,' WRONG SQUARE -- ASKED FOR: Y = ',F9.3,', X = ',
* F9.3,', GOT: Y1 = ',F9.3,', Y2 = ',F9.3,', X1 = ',F9.3,
* ', X2 = ',F9.3)
C      RETURN
C      9 CONTINUE
C      9 WRITE(6,200)ISN,Y,X,IRP

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```
C 200 FORMAT(1X,' ISN = ',I5,' NO DATA FOR Y = ',F9.3,' X = ',F9.3,/  
C   * 1X,' IRP = ',I5)  
RETURN  
9090 WRITE(6,*)"ERROR IN OPENING UNIT 22, BATHY*DBDB"  
STOP  
END
```

```

SUBROUTINE DEPTHC(D,T,S,NLEV,IZFLG,IDFLG)
C
C THIS PROGRAM CHECKS FOR NEGATIVE DEPTHS (IDFLG=1),
C FOR NON-MONOTONIC DEPTHS (IDFLG=2), AND FOR DEPTHS
C EXCEEDING A MAX VALUE (IZFLG=1).
C NEGATIVE DEPTHS ARE MADE POSITIVE.
C IF DEPTHS WERE NEGATIVE AND ARE NON-MONOTONIC WHEN
C MADE POSITIVE, IDFLG=3.
C DUPLICATE DEPTHS ARE REMOVED, AND THE DEPTHS ARE
C THEN SORTED.
C
COMMON /ZLIM/ ZMAX,ZVAL
DIMENSION D(1),T(1),S(1)
C
IDFLG=0
IZFLG=0
C
IF NO DATA RETURN
IF(NLEV.EQ.0)RETURN
C
CHECK FOR NEGATIVE DEPTHS.
DO 100 I=1,NLEV
IF(D(I).LT.0.0)THEN
IDFLG=1
D(I)=-D(I)
END IF
C
CHECK FOR DEPTHS EXCEEDING MAX VALUE
IF(D(I).GT.ZMAX)THEN
IZFLG=1
ZVAL=D(I)
RETURN
END IF
100 CONTINUE
C
C
SORT DEPTH LEVELS
IF(NLEV.LE.1)GO TO 999
DO 150 I=1,NLEV
IFLAG=0
DO 140 J=1,NLEV-1
IF(D(J).GT.D(J+1))THEN
XD=D(J+1)
XT=T(J+1)
XS=S(J+1)
D(J+1)=D(J)
D(J)=XD
T(J+1)=T(J)
T(J)=XT
S(J+1)=S(J)
S(J)=XS
IFLAG=1
IF(IDFLG.EQ.0)IDFLG=2
IF(IDFLG.EQ.1)IDFLG=3
END IF

```

```
140 CONTINUE
  IF(IFLAG.EQ.0)GO TO 180
150 CONTINUE
C
C
C  ELIMINATE DUPLICATIONS
180 DO 200 J=1,NLEV-1
  IF(D(J+1)-D(J).LT.0.01)D(J)=-1.
200 CONTINUE
  ICT=0
  DO 250 J=1,NLEV
  IF(D(J).LT.0)GO TO 250
  ICT=ICT+1
  D(ICT)=D(J)
  T(ICT)=T(J)
  S(ICT)=S(J)
250 CONTINUE
  NLEV=ICT
C
999 RETURN
END
```

```

SUBROUTINE DUPGET(TIME,INO,KK,DELTIM,DELDIS,IDLPER,ICT)
CC THIS PROGRAM CHECKS TIME-SORTED PROFILE PAIRS FOR DUPLICATES.
C WHEN PROFILES ARE DUPLICATED, THAT IS, THEY FALL IN THE SAME
C TIME (DELTIM) - DISTANCE (DELDIS) WINDOW, THE SHORTER PROFILE(S)
C IS ELIMINATED. IF THEY ARE THE SAME LENGTH, THE FIRST PROFILE
C IS KEPT. DISTANCES ARE CHECKED FOR PROFILES IN THE SAME TIME
C WINDOW BETWEEN THE FIRST PROFILE AND EACH OF THE OTHER
C PROFILES. IF THE FIRST PROFILE IN THE WINDOW IS FLAGGED
C AS A DUPLICATE, THE WINDOW BEGINS AGAIN AT THE FIRST PROFILE
C NOT FLAGGED AS DUPLICATE. OTHERWISE, ALL PROFILE DISTANCES
C FROM THE FIRST PROFILE ARE CHECKED AND DUPLICATES ARE
C FLAGGED. THE NEXT TIME WINDOW BEGINS AT THE FIRST NON-
C FLAGGED PROFILE. DUPLICATE PROFILE NUMBERS ARE STORED IN
C IDUPER.
CC
      DIMENSION INO(1),TIME(1),IDLPER(1)
      EQUIVALENCE (TIME(1),IDLPER(1))
      DO 10 I=2,KK
C
C SKIP DUPLICATES ALREADY FLAGGED
      IF(INO(I-1).LT.0)GO TO 10
      I1=I
2     CONTINUE
      IF(INO(I1).LT.0)THEN
          I1=I1+1
          IF(I1.GT.KK)GO TO 10
          GO TO 2
      END IF
C
C CHECK TIME WINDOW
CC
      IF(TIME(I1)-TIME(I-1).LE.DELTIM)THEN
C
C CHECK DISTANCE WINDOW
C
      READ(24'INO(I-1),ERR=9010)ALAT1,ALON1,NLEV1
      5    READ(24'INO(I1),ERR=9010)ALAT,ALON,NLEV
C
      GET DISTANCE IN KM
      CALL GMPLIC(ALAT,ALON,ALAT1,ALON1,DIS)
C
      IF DUPLICATE IS FOUND, SET FLAG - MAKE PROFILE NO. NEG.
      IF(DIS.LT.DELDIS)THEN
          IDFL=1
          IF(NLEV.GT.NLEV1)THEN
              IN=INO(I1)
              IOUT=INO(I-1)
              INO(I-1)=-INO(I-1)
          END IF
          IF(NLEV.LE.NLEV1)THEN
              IN=INO(I-1)
              IOUT=INO(I1)
              INO(I1)=-INO(I1)
          END IF
      END IF

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        WRITE(29,*)"DUPLICATE PROFILES ',IN,' - ',IOUT,' REMOVE ',IOUT
        END IF
C     START NEXT TIME WINDOW IF PRESENT WINDOW BEGINS WITH DUP.
        IF(INO(I-1).LT.0)GO TO 10
C     CHECK WHETHER NEXT PROFILE LIES IN THE TIME WINDOW
        8      I1=I1+1
        IF(I1.GT.KK)GO TO 10
C     SKIP PROFILES ALREADY FLAGGED
        IF(INO(I1).LT.0)GO TO 8
        IF(TIME(I1)-TIME(I-1).LE.DELTIM)GO TO 5
CC
        END IF
CC
C
        10    CONTINUE
C
C
C     IF NO DUPLICATES ARE FOUND, RETURN
        ICT=0
        IF(IDFL.EQ.0)RETURN
C     STORE NEGATIVE INO'S (AS POSITIVE) IN IDUPER, IDUPER CONTAINS
C     PROFILE NUMBERS OF DUPLICATE PROFILES. IDUPER WAS NOT FILLED
C     DIRECTLY IN ABOVE SECTION IN ORDER TO CONSERVE ARRAY SPACE.
        DO 20 I=1,KK
        IF(INO(I).LT.0)THEN
            ICT=ICT+1
            IDUPER(ICT)=ABS(INO(I))
        END IF
        20    CONTINUE
C
C     SORT IDUPER
        IF(ICT.LE.1)RETURN
        DO 40 I=1,ICT
        IFLAG=0
        DO 30 J=1,ICT-1
        IF(IDUPER(J).GT.IDUPER(J+1))THEN
            IZ=IDUPER(J+1)
            IDUPER(J+1)=IDUPER(J)
            IDUPER(J)=IZ
            IFLAG=1
        END IF
        30    CONTINUE
        IF(IFLAG.EQ.0)RETURN
        40    CONTINUE
C
        RETURN
9010 WRITE(6,*)" ERROR IN READING UNIT 24'
        STOP
        END

```

```

        SUBROUTINE GMLIC (ALATA,ALONA,ALATB,ALONB,S)
C
C THIS ROUTINE COMPUTES DISTANCE, S, BETWEEN ALATA,ALONA
C AND ALATB,ALONB.
C
C      DATA ARC1/0.484813681110E-5/,AXIS/6378206.4/,
C      1ESQ/0.676865799729E-2/
C
C      STATEMENT FUNCTIONS
C
C      R1(D) = .77319978E-5*(1258.0483-D*(68.112835+D))
C      R1(D) = .77319978E-5*(1258.0483-D*(68.112835+D))
C      R2(D) = .97935127E-2*D
C      S1(D) = .95512914E-5*(20.819968-D*(40.782792+D))
C      S2(D) = .13348137E-3*(147.73977+D*(71.369887+D))
C      T1(D) = .909646805E-6*(32444.5815-D*(144.739770+D))
C      T2(D) = .13348137E-3*(147.73977-D*(148.73977-D))
C
C      CONVERT LAT AND LONG FROM DEGREES TO SECONDS
C          ALAT1=ALATA*3600.
C          ALON1=ALONA*3600.
C          ALAT2=ALATB*3600.
C          ALON2=ALONB*3600.
C
C      COMPUTATION OF DELTA LAMDA
C
C          XPHIM=((ALAT1+ALAT2)/2.)*ARC1
C          XSIN=SIN (XPHIM)
C          XCOS=COS (XPHIM)
C          D=XSIN**2
C          DLONG=ALON2-ALON1
C          DLAT=ALAT2-ALAT1
C          V=(DLAT/100000.)**2
C          W=(DLONG/100000.)**2
C          AN=SQRT (1.-ESQ*D)
C          XRACV=AXIS/AN
C          XRACM=(AXIS*(1.-ESQ))/(AN*(1.-ESQ*D))
C          XH=XCOS*XRACV*ARC1
C          XB=XRACM*ARC1
C          XIK=DLONG*XH*(1.+V*R1(D)-W*R2(D))
C          YIK=DLAT*XB*(1.+V*S1(D)-W*S2(D))
C          DELLA = .5*((DLONG*XSIN)*(1. + V*T1(D) + W*T2(D)))
C          S=SQRT (XIKA**2+YIKA**2)
C
C      DIST IN KM
C          S=S/1000.
C          RETURN
C          END

```

```

SUBROUTINE INVERC(D,T,S,NLEV,ZIVC,INVFLG)
C THIS PROGRAM CHECKS FOR DENSITY OR TEMPERATURE
C INVERSIONS ACCORDING TO THE TOLERANCES DENTOL
C AND TTOL.
C
COMMON/INVERT/DENTOL,TTOL,BTOL,DELDEN,DELT
DIMENSION D(1),T(1),S(1),INVFLG(1)
C
IC=0
INVFLG(1)=0
INVFLG(2)=0
C CHECK FOR TEMPERATURE INVERSIONS
IC=0
DO 500 I=1,NLEV
IF(D(I).LT.ZIVC)GO TO 200
IF(T(I).LT.-800.)GO TO 500
C
IF(IC.EQ.0)THEN
IC=1
T1=T(I)
GO TO 500
END IF
C
DELT=T(I)-T1
IF(DELT.GT.TTOL)THEN
INVFLG(2)=1
GO TO 510
END IF
C
C LOCAL MIN AND MAX TEMP IN INVERSION ARE USED
TSAV=T1
IF(T(I).GT.TSAV)THEN
T1=TSAV
ELSE
T1=T(I)
END IF
500 CONTINUE
510 CONTINUE
C
C CHECK FOR DENSITY INVERSIONS
IC=0
DO 200 I=1,NLEV
IF(D(I).LT.ZIVC)GO TO 200
IF(T(I).LT.-800.0.OR.S(I).LT.-800.0)GO TO 200
IF(S(I).LT.0.001)GO TO 200
DEN=EQSTAT(T(I),S(I),D(I))
C
IF(IC.EQ.0)THEN
IC=1
DEN1=DEN
GO TO 100
END IF
C
DELDEN=DEN1-DEN

```

```

IF(DELDEN.GT.DENTOL)THEN
  INVFLG(1)=1
  GO TO 999
END IF

C
C LOCAL MIN AND MAX DENSITY IN INVERSION ARE USED
  DSAV=DEN1
  IF(DEN.LT.DSAV)THEN
    DEN1=DSAV
  ELSE
    DEN1=DEN
  END IF

C
  100 CONTINUE
  200 CONTINUE
C
  999 RETURN
END

C
C EQUATION OF STATE OF SEA WATER- CHEN & MILLERO
C DEEP SEA RESEARCH, 1977, VOL 24,PP 365-369
  FUNCTION EQSTAT(T,S,P)
C ALL UNITS CGS
C T IN DEGREES C
C S IN PARTS PER THOUSAND
C P IN DECIBARS (1DB ABOUT EQUALS 1M)
C DENSITY IN GR/CM**3
  D0=1.0281045-5.35633E-05*T-6.78195E-06*T*T
  * +7.0517E-08*T**3-8.4794E-10*T**4+5.057E-12*T**5
  * +(8.0792E-04-3.2481E-06*T+6.423E-08*T**2-6.490E-10*T**3)
  * *(S-35.)+2.045E-07*(S-35.)**2
  V0=1.0/D0
  K0=21585.72+132.5657*T-2.0860*T*T+8.7648E-03*T**3
  * +(56.928-0.2975*T)*(S-35.)
  A=3.40075-7.6371E-3*T+2.9651E-4*T**2
  * +(2.287E-3-3.255E-4*T)*(S-35.)
  B=2.211E-05
  PP=0.1*P
  VP=V0-VO*PP/(K0+A*PP+B*PP**2)
  DENS=1.0/VP
  EQSTAT=DENS
  RETURN
END

```

```

C SUBROUTINE LANDMASK READS DATA FROM THE FILE, LANDMASK.DAT
C AND RETURNS A VALUE OF 1 OR 0 DEPENDING ON WHETHER THE WHETHER THE
C DATA IN THE SPECIFIED AREA IS LAND OR WATER.
C THE INPUT PARAMETERS ARE:
C   DLATD = DEGREE LATITUDE REQUESTED
C   DLATM = MINUTE LATITUDE REQUESTED
C   DLOND = DEGREE LONGITUDE REQUESTED
C   LONM = MINUTE LONGITUDE REQUESTED
C THE OUTPUT PARAMETER IS:
C   IMASK = AN INTEGER WITH THE VALUE OF 1 IF THE
C           REQUESTED RECORD IS LAND OR 0 IF THE
C           REQUESTED RECORD IS WATER
C
C SUBROUTINE LANDMASK WAS WRITTEN BY J. HAMMACK AND
C E. GREMILLION, NAVOCEANO, CODE 8321. THE LANDMASK
C DATA FILE WAS BASED ON WORK DONE BY MIKE CARRON, CODE 022.
C
C SUBROUTINE LANDMASK(DLATD,DLATM,DLOND,LONM,MASK)
C IMPLICIT INTEGER (A-Z)
C DIMENSION OUT(5)
C
C DATA ICK/1/
C LATD=DLATD
C LATM=DLATM
C LOND=DLOND
C IF (PASS.EQ.0)THEN
C   OPEN (UNIT=10,FILE='DRBO:[BILL.MOODS]LANDMASK.DAT',
C 1      ACCESS='DIRECT',FORM='UNFORMATTED',RECL=5,
C 2      MAXREC=52200,STATUS='OLD',READONLY)
C END IF
C PASS=1
C IF (LATD.LE.0.AND.LATM.LT.0) THEN
C   LATD = LATD - 1
C   LATM = ABS(LATM)
C END IF
C
C IF (DLOND.LT.0) LOND = DLOND +360
C IF (LONM.LT.0) LONM = ABS(LONM)
C RECORD = (LATD + 72)*360 + LOND + 1
C IF(ICK.EQ.1)GO TO 10
C IF(RECORD.EQ.RECSAV)RETURN
C 10 READ (10'RECORD) OUT
C K = (LATM/5)*12 + (LONM/5)
C MASK = IBITS(OUT(1),K,1)
C ICK=0
C RECSAV=RECORD
C RETURN
C END

```

10

```

C COMPILER (LINK=IBJ$)
C
C THIS ROUTINE IS AVAILABLE ONLY ON THE UNIVAC.
C SUBROUTINE TO CHECK FOR LAND AT TEN MINUTE GRID INTERVAL
C
C WRITTEN BY J. C. DEPNER
C DATE : 06-28-84
C
C X1 = LATITUDE DEGREES (OR DEGREES DECIMAL )
C X2 = LATITUDE MINUTES
C X3 = LONGITUDE DEGREES (OR DEGREES DECIMAL )
C X4 = LONGITUDE MINUTES
C X5 = 0 FOR WATER , 1 FOR LAND
C
C SUBROUTINE LNDCHK (X1,X2,X3,X4,X5)
C INTEGER ARRAY(27)
C IF(IFIRST.EQ.0)THEN
C
C ASSIGN MAP FILE.
C
C OPEN(28,FILE='CIA*ASCII',STATUS='OLD',ACCESS='DIRECT',
C * FORM='UNFORMATTED',RECL=27,RCDS=64389,ASSOC=IKEY)
C IFIRST=1
C END IF
C
C ADD 90 TO LATITUDE
C ADD 360 TO LONGITUDE IF NEGATIVE
C
C XLAT=(X1+(X2/60.0)*SIGN(1.0,X1))+90.0
C XLON=(X3+(X4/60.0)*SIGN(1.0,X3))
C IF(XLON.LT.0.0)XLON=XLON+360.0
C
C OFFSET BY 5 MINUTES TO GET SQUARE CENTERED ON GRID
C GET INTEGER LAT AND LON DEGREES
C
C LAT=XLAT+.08333333
C LON=XLON+.08333333
C
C GET LAT AND LON MINUTES TO PRECISION OF TEN
C ( 12.5 = 10, 21.73 = 20, ETC. )
C
C LATMIN=(INT((XLAT-FLOAT(LAT))*60.0+.5)/10.0)*10
C LONMIN=(INT((XLON-FLOAT(LON))*60.0+.5)/10.0)*10
C
C IREC=LAT*360+MOD(LON+180,360)+1 WAS NOT USED AS
C ADDRESSING SCHEME TO LOAD THE LAND MASK INFORMATION
C DUE TO A BAD CASE OF 'HURRY UP' WHEN LOADING. (JCD)
C
C IREC=LAT*360+MOD(LON,360)+181
C
C IF IN SAME DEGREE SQUARE AS LAST ACCESS ...
C
C IF(IPREC.EQ.IREC)THEN
C

```

```

C     IF IN THE SAME 10 MINUTE SQUARE AS LAST ACCESS ...
C
C     IF(IPLATM.EQ.LATMIN.AND.IPLONM.EQ.LONMIN)THEN
C
C       RETURN SAME X5 AS LAST ACCESS
C
C       X5=PX5
C       RETURN
C       END IF
C     ELSE
C
C       IF NOT IN SAME DEGREE SQUARE AS LAST ACCESS, READ NEW RECORD
C
C       READ(28,REC=IREC)ARRAY
C     END IF
C
C     READ LAND MASK BITS FROM ARRAY AND SET X5 FOR LAND OR WATER
C
J=0
DO 10 I=2,20,6
  IF(LATMIN/10.EQ.J)THEN
    INDEX=I+LONMIN/10
    IF(BITS(ARRAY(INDEX),1,1).EQ.1)THEN
      X5=1.0
    ELSE
      X5=0.0
    END IF
    GO TO 30
  END IF
  J=J+1
10 CONTINUE
IBIT=19
DO 20 I=1,7,6
  IF(LATMIN/10.EQ.J)THEN
    INDEX=I+LONMIN/10
    IF(LONMIN/10.EQ.0.AND.J.EQ.4)THEN
      INDEX=26
      IBIT=1
    END IF
    IF(BITS(ARRAY(INDEX),IBIT,1).EQ.1)THEN
      X5=1.0
    ELSE
      X5=0.0
    END IF
    GO TO 30
  END IF
  J=J+1
20 CONTINUE
C
C     SAVE LAST ACCESS DATA
C
30 IPREC=IREC
IPLATM=LATMIN
IPLONM=LONMIN

```

PX5=X5
RETURN
END

```

C      SUBROUTINE NODAYS (IY,IM, ID,NDYM,NDY,IERR)
C      COMPUTES NODAYS IM MONTH, NDYM, AND
C      COMPUTES NUMBER OF THE DAY IN A YEAR, NDY, FROM
C      YEAR-IY, MONTH-IM, AND DAY OF MONTH-ID
C      IERR = 0
C      IF( IM-12)1,1,2
1      2 WRITE (6,700)
700 FORMAT(21H MON GREATER THAN 12   )
C      IERR=1
C      RETURN
1      1 IF(IM) 3,3,4
3      3 WRITE (6,705)
705 FORMAT ( 18H MONTH IS TO SMALL )
C      IERR =1
C      RETURN
4      4 IF(ID) 5,6,6
5      5 WRITE (6,710)
710 FORMAT(12H DAY IS NEG   )
C      IERR =1
C      RETURN
6      6 IF(IY) 7,8,8
7      7 WRITE (6,715)
715 FORMAT (13H YEAR IS NEG )
C      IERR =1
C      RETURN
8      8 M = IM
      NDM =30+M+M/8-2*((M+M/8)/2)-((8-M)/6-(7-M)/6)*(1+(IY-4*(IY/4)+4)
1      1 /5 )
      IF( ID) 9,9,10
9      9 NDY =0
      NDYM = NDM
      RETURN
10     10 IF( ID - NDM)11,11,12
12     12 WRITE (6,720)
720 FORMAT ( 17H DAY IS TO LARGE   )
C      IERR= 1
C      RETURN
11     11 NDYM = NDM
      N= IM-1
      ISUM = 0
      IF(N) 30,30,35
35     35 DO 15 M =1,N
      NDM =30+M+M/8-2*((M+M/8)/2)-((8-M)/6-(7-M)/6)*(1+(IY-4*(IY/4)+4)
1      1 /5 )
      15 ISUM = ISUM + NDM
      30 ISUM = ISUM + ID
      NDY = ISUM
      RETURN
END

```

```

C*****
C
C SUBROUTINE RDIN
C THIS SUBROUTINE READS INPUT INSTRUCTIONS AND SETS DEFAULTS FOR
C MOODSED.
C
C*****
C
C SUBROUTINE RDIN(ISOL)
C
C CHARACTER*4 A
C CHARACTER*72 OUTFILE,INFILE,IN
C
& COMMON /VALIM /TMIN,TMAX,SMIN,SMAX,TEMP,SAL,
& TL01,THI1,SL01,SHI1,ZMIN
& COMMON /FILES/ INFILE,OUTFILE
& COMMON /CHKS/ LCHK,IDCK,ITOC,ISOC,ISBC,ITBC,IVCK,ZIVC,IECK,IBCK,
& IMIS,DMIS,STOL,IDUP,IMIN,DIST
& COMMON /INVERT/ DTOL,TTOL,BTOL
COMMON /ZLIM/ ZMAX,ZVAL
C
C DATA TMIN,TMAX,SMIN,SMAX /-2.5,30.,33.,38.,6500./
C DATA TL01,THI1,SL01,SHI1,ZMIN /-2.5,12.,34.,37.,6500./
C DATA DTOL,TTOL,BTOL,ZIVC,DMIS,STOL/0.00001,1.,1.0,0.0,20.,3.5/
C DATA IMIN,DIST/60,10.0/
C DATA IVCK,IBCK,IECK/0,0,0/
C DATA LCHK,IDCK,ITOC,ISOC,ISBC,ITBC,IMIS, IDUP /0,0,0,0,0,0,0,0/
C DATA INFILE,OUTFILE '/[BILL.MOODS]MOODS','MOODS'
C*****
C
C OPEN SCRATCH FILE TO ALLOW LIST DIRECTED READ
CLOSE(UNIT=23)
OPEN(UNIT=23,STATUS='SCRATCH',ERR=9096)
C
C READ INPUT INTO INTERNAL FILE
10 READ(5,5000,ERR=9000,END=999)IN
5000 FORMAT(A)
C WRITE INSTRUCTION TO UNIT 23
WRITE(23,5000)IN(6:72)
BACKSPACE 23
C
C*****
C
C TRANSLATE INSTRUCTION
A=IN(1:4)
C
IF(A(1:1).EQ.'H'.OR.A(1:1).EQ.'h')THEN
  ISOL=1
  RETURN
END IF
C
IF(A(1:2).EQ.'C '.OR.A(1:2).EQ.'c ')GO TO 10
C
IF(A.EQ.'IFIL'.OR.A.EQ.'ifil')THEN

```

```
INFILE=IN(6:72)
GO TO 10
END IF
C
IF(A.EQ.'OFIL'.OR.A.EQ.'ofil')THEN
  OUTFILE=IN(6:72)
  GO TO 10
END IF
C
IF(A.EQ.'TMIN'.OR.A.EQ.'tmin')THEN
  READ(23,*,ERR=9097)TMIN
  GO TO 10
END IF
C
IF(A.EQ.'TMAX'.OR.A.EQ.'tmax')THEN
  READ(23,*,ERR=9097)TMAX
  GO TO 10
END IF
C
IF(A.EQ.'SMIN'.OR.A.EQ.'smin')THEN
  READ(23,*,ERR=9097)SMIN
  GO TO 10
END IF
C
IF(A.EQ.'SMAX'.OR.A.EQ.'smax')THEN
  READ(23,*,ERR=9097)SMAX
  GO TO 10
END IF
C
C
IF(A.EQ.'TL01'.OR.A.EQ.'tl01')THEN
  READ(23,*,ERR=9097)TL01
  GO TO 10
END IF
C
IF(A.EQ.'THI1'.OR.A.EQ.'thi1')THEN
  READ(23,*,ERR=9097)THI1
  GO TO 10
END IF
C
IF(A.EQ.'SL01'.OR.A.EQ.'sl01')THEN
  READ(23,*,ERR=9097)SL01
  GO TO 10
END IF
C
IF(A.EQ.'SHI1'.OR.A.EQ.'shi1')THEN
  READ(23,*,ERR=9097)SHI1
  GO TO 10
END IF
C
IF(A.EQ.'ZMIN'.OR.A.EQ.'zmin')THEN
  READ(23,*,ERR=9097)ZMIN
  GO TO 10
END IF
```

C
C
IF(A.EQ.'ZMAX'.OR.A.EQ.'zmax')THEN
READ(23,*,ERR=9097)ZMAX
GO TO 10
END IF
C
IF(A.EQ.'LCHK'.OR.A.EQ.'lchk')THEN
READ(23,*,ERR=9097)LCHK
GO TO 10
END IF
C
IF(A.EQ.'IECK'.OR.A.EQ.'ieck')THEN
READ(23,*,ERR=9097)IECK
GO TO 10
END IF
C
IF(A.EQ.'IDCK'.OR.A.EQ.'idck')THEN
READ(23,*,ERR=9097)IDCK
GO TO 10
END IF
C
IF(A.EQ.'ITOC'.OR.A.EQ.'itoc')THEN
READ(23,*,ERR=9097)ITOC
GO TO 10
END IF
C
IF(A.EQ.'ISOC'.OR.A.EQ.'isoc')THEN
READ(23,*,ERR=9097)ISOC
GO TO 10
END IF
C
IF(A.EQ.'ISBC'.OR.A.EQ.'isbc')THEN
READ(23,*,ERR=9097)ISBC
GO TO 10
END IF
C
IF(A.EQ.'ITBC'.OR.A.EQ.'itbc')THEN
READ(23,*,ERR=9097)ITBC
GO TO 10
END IF
C
IF(A.EQ.'DTOL'.OR.A.EQ.'dtol')THEN
READ(23,*,ERR=9097)DTOL
GO TO 10
END IF
C
IF(A.EQ.'TTOL'.OR.A.EQ.'ttol')THEN
READ(23,*,ERR=9097)TTOL
GO TO 10
END IF
C
IF(A.EQ.'BTOL'.OR.A.EQ.'btol')THEN
READ(23,*,ERR=9097)BTOL

```
GO TO 10
END IF
C
IF(A.EQ.'IBCK'.OR.A.EQ.'ibck')THEN
READ(23,*,ERR=9097)IBCK
GO TO 10
END IF
C
IF(A.EQ.'IVCK'.OR.A.EQ.'ivck')THEN
READ(23,*,ERR=9097)IVCK
GO TO 10
END IF
C
IF(A.EQ.'ZIVC'.OR.A.EQ.'zivc')THEN
READ(23,*,ERR=9097)ZIVC
GO TO 10
END IF
C
IF(A.EQ.'IMIS'.OR.A.EQ.'imis')THEN
READ(23,*,ERR=9097)IMIS
GO TO 10
END IF
C
IF(A.EQ.'DMIS'.OR.A.EQ.'dmis')THEN
READ(23,*,ERR=9097)DMIS
GO TO 10
END IF
C
IF(A.EQ.'STOL'.OR.A.EQ.'stol')THEN
READ(23,*,ERR=9097)STOL
GO TO 10
END IF
C
IF(A.EQ.'IDUP'.OR.A.EQ.'idup')THEN
READ(23,*,ERR=9097)IDUP
GO TO 10
END IF
C
IF(A.EQ.'IMIN'.OR.A.EQ.'imin')THEN
READ(23,*,ERR=9097)IMIN
GO TO 10
END IF
C
IF(A.EQ.'DIST'.OR.A.EQ.'dist')THEN
READ(23,*,ERR=9097)DIST
GO TO 10
END IF
C
C*****
C
9000 WRITE(6,*)"ERROR IN READING INSTRUCTION, TRY AGAIN"
GO TO 10
9096 WRITE(6,*)"ERROR IN OPENING UNIT 23, DO NOT USE UNIT 23!"
```

STOP
9097 WRITE(6,*)'ERROR WHILE READING INSTRUCTION ',A,' TRY AGAIN'
GO TO 10
999 RETURN
END

```

SUBROUTINE RDMOOD(D,T,S,NLEV,MAXLEV,IEOF)
C
C*****THIS PROGRAM READS THE MOODS DATA WHICH HAS BEEN EXTRACTED
C FROM THE MOODS DATA BASE
C
C!!!!!!!!!!!!!!CHANGE THIS ROUTINE IF DIFFERENT INPUT FORMATS ARE REQUIRED!!!
C!!!!!!CORRESPONDING CHANGES MUST THEN BE MADE TO THE WRITE ROUTINE!!
C!!!!!!WEMOOD.!!!!!!!
C*****CHARACTER*13 GL1,GL2
C*****CHARACTER*131 INPUTS,INPUT
C*****CHARACTER*10 IP
C
C      COMMON /RDCOM/ F(10),ID(10),TOP,BOT,ISEQ
C      COMMON /RDCOMA/ INPUTS,GL1,GL2,IP
C
C      DIMENSION D(1),T(1),S(1)
C
C      DATA JPAS /0/
C
C*****READ MOODS DATA
1      READ(27,5000,ERR=9000,END=900)INPUT
5000  FORMAT(131A)
C
C      SKIP HEADER LABELS
      IF(INPUT(1:1).EQ.'L')THEN
          INPUTS=INPUT
C      INPUTS IS JUST A HEADER LINE, LAT,LONG, ETC.
C
C      GET PAGE NO.
      IP=INPUT(98:102)
      GO TO 1
      END IF
C
C      READ HEADER
C      LATITUDE: F(1), LONGITUDE: F(2), GL1: YEARMMD HHMM,
C      GL2: SHIP KEY (IDENTIFYING LABEL), ID(4): DATA SOURCE CODE,
C      ID(5) AND ID(6): MOODS ERROR CODES, TOP: MIN DEPTH,
C      BOT: MAXIMUM DEPTH, NLEV: NO. OF DEPTH LEVELS,
C      ISEQ: CONSECUTIVE PROFILE SEQUENCE NO. BEGINNING WITH 1.
C
      READ(INPUT,5001,ERR=9000,END=900)F(1),F(2),GL1,GL2,
      & ID(2),ID(3),ID(4),ID(5),ID(6),TOP,
      & BOT,NLEV,ISEQ
5001  FORMAT(1X,F6.2,F9.2,2X,A13,2X,A10,3I3,2(1X,02),1X,
      & 2F9.1,I6,2X,I6)
CW      WRITE(6,*)F(1),F(2),GL1,GL2,
CW      & ID(2),ID(3),ID(4),ID(5),ID(6),
CW      & TOP,BOT,NLEV

```

```
C DO NOT ALLOW MORE THAN MAXLEV OF LEVELS
C   IF(NLEV.GT.MAXLEV)THEN
C     WRITE(6,*)"MAXIMUM NO. OF LEVELS EXCEEDED - ",MAXLEV,
C     & 'PROFILE ',ISEQ
C     WRITE(29,*)"MAXIMUM NO. OF LEVELS EXCEEDED - ",MAXLEV,
C     & 'PROFILE ',ISEQ
C     GO TO 9000
C   END IF
C READ DEPTHS  D(I)
C   READ(27,5003,ERR=9000)(D(I),I=1,NLEV)
5003 FORMAT(15F7.1)
CW      WRITE(6,*)(D(I),I=1,NLEV)
C
C READ TEMPERATURES  T(I)
C   READ(27,5002,ERR=9000)(T(I),I=1,NLEV)
5002 FORMAT(1X,15F7.2)
CW      WRITE(6,*)(T(I),I=1,NLEV)
C
C READ SALINITIES  S(I)
C   READ(27,5002,ERR=9000)(S(I),I=1,NLEV)
CW      WRITE(6,*)(S(I),I=1,NLEV)
C
C NORMAL RETURN
C   IEOF=0
C   RETURN
C END OF FILE RETURN
900  IEOF=1
JPAS=JPAS+1
WRITE(6,*)" END OF DATA REACHED, PASS' ,JPAS"
RETURN
C ERROR RETURN
9000 IEOF=2
RETURN
END
```

```

C*****
C
C SUBROUTINE SOLIC
C THIS SUBROUTINE SOLICITATES INPUT INFORMATION WHEN REQUESTED BY
C "HELP" INSTRUCTION.
C
C*****
C          SUBROUTINE SOLIC
C
C
C          CHARACTER*72 OUTFILE,INFILE,QQ
C          CHARACTER*4 YON
C
C          COMMON /VALIM /TMIN,TMAX,SMIN,SMAX,TEMP,SAL,
C          &           TMIN1,TMAX1,SMIN1,SMAX1,ZMIN
C          COMMON /FILES/ INFILE,OUTFILE
C          COMMON /CHKS/ LCHK,IDCK,ITOC,ISOC,ISBC,ITBC,IVCK,ZIVC,IECK,IBCK,
C          &           IMIS,DMIS,STOL,IDUP,IMIN,DIST
C          COMMON /ZLIM/ ZMAX,ZVAL
C          COMMON /INVERT/ DTOL,TTOL,BTOL,DELDEN,DELT
C
C*****
C          WRITE(6,*)' A BLANK RETURN PRESERVES DEFAULT VALUES'
C          WRITE(6,*)' TYPE "CTRL Z" TO END SOLICITATION AND BEGIN PROGRAM'
C          & , ' EXECUTION.'
C          "CTRL Z" IS USED TO BRANCH FROM THE "END=" CONTAINED IN THE READ
C          STATEMENT, FOR THE VAX COMPUTER. "&END" IS USED FOR A UNIVAC COMPUTER.
C          THIS STATEMENT NEEDS TO BE TAILORIZED FOR THE PARTICULAR COMPUTER
C          BEING USED.
C
C          WRITE(6,*)
C          WRITE(6,*)'DEFAULT INPUT FILENAME IS: ',INFILE
C          WRITE(6,*)
C          WRITE(6,*)'INPUT FILENAME? '
C          READ(5,555,END=999)QQ
555       FORMAT(72A)
          IF(QQ.NE.' ')INFILE=QQ
          WRITE(6,*)'INPUT FILENAME IS: ',INFILE
C
C          WRITE(6,*)
C          WRITE(6,*)'DEFAULT OUTPUT FILENAME IS ',OUTFILE
C          WRITE(6,*)'OUTPUT FILENAME? '
C          READ(5,555,END=999)QQ
          IF(QQ.NE.' ')OUTFILE=QQ
          WRITE(6,*)'OUTPUT FILENAME IS ',OUTFILE
C
C          WRITE(6,*)
C          YON='YES'
C          IF(ITBC.EQ.1)YON='NO'
C          WRITE(6,*)'CHECK FOR BAD TEMPERATURES? DEFAULT IS ',YON
C          READ(5,555,END=999)QQ
          IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
              ITBC=0

```

```

YON='YES'
END IF
IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
  ITBC=1
  YON='NO'
END IF
WRITE(6,*)'CHECK FOR BAD TEMPERATURES? ',YON
C
IF(YON.EQ.'YES')THEN
  WRITE(6,*)
  WRITE(6,*)'MINIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMIN
90  WRITE(6,*)'NEW MINIMUM TEMPERATURE?'
  READ(5,555,END=999)QQ
  IF(QQ.NE.' ')THEN
    WRITE(29,555)QQ
    BACKSPACE 29
    READ(29,*,ERR=90)TMIN
  END IF
  WRITE(6,*)'MINIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMIN
C
WRITE(6,*)
WRITE(6,*)'MAXIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMAX
91  WRITE(6,*)'NEW MAXIMUM TEMPERATURE?'
  READ(5,555,END=999)QQ
  IF(QQ.NE.' ')THEN
    WRITE(29,555)QQ
    BACKSPACE 29
    READ(29,*,ERR=91)TMAX
  END IF
  WRITE(6,*)'MAXIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMAX
END IF
C
WRITE(6,*)
YON='YES'
IF(ISBC.EQ.1)YON='NO'
WRITE(6,*)'CHECK FOR BAD SALINITIES? DEFAULT IS ',YON
READ(5,555,END=999)QQ
IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
  ISBC=0
  YON='YES'
END IF
IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
  ISBC=1
  YON='NO'
END IF
WRITE(6,*)'CHECK FOR BAD SALINITIES? ',YON
C
IF(YON.EQ.'YES')THEN
  WRITE(6,*)
  WRITE(6,*)'MINIMUM SALINITY ALLOWED IS ',SMIN
92  WRITE(6,*)'NEW MINIMUM SALINITY?'
  READ(5,555,END=999)QQ
  IF(QQ.NE.' ')THEN
    WRITE(29,555)QQ

```

```

BACKSPACE 29
READ(29,* ,ERR=92)SMIN
END IF
WRITE(6,*)"MINIMUM SALINITY ALLOWED IS ',SMIN
C
93 WRITE(6,*)
WRITE(6,*)"MAXIMUM SALINITY ALLOWED IS ',SMAX
WRITE(6,*)"NEW MAXIMUM SALINITY?"
READ(5,555,END=999)QQ
IF(QQ.NE.' ')THEN
WRITE(29,555)QQ
BACKSPACE 29
READ(29,* ,ERR=93)SMAX
END IF
WRITE(6,*)"MAXIMUM SALINITY ALLOWED IS ',SMAX
END IF
C
94 WRITE(6,*)
WRITE(6,*)"MAXIMUM DEPTH (M) ALLOWED IS ',ZMAX
WRITE(6,*)"NEW MAXIMUM DEPTH?"
READ(5,555,END=999)QQ
IF(QQ.NE.' ')THEN
WRITE(29,555)QQ
BACKSPACE 29
READ(29,* ,ERR=94)ZMAX
END IF
WRITE(6,*)"MAXIMUM DEPTH (M) ALLOWED IS ',ZMAX
C
& WRITE(6,*)
YON='YES'
IF(IVCK.EQ.1)YON='NO'
WRITE(6,*)"CHECK FOR TEMP/DENSITY INVERSIONS? DEFAULT IS '
,YON
READ(5,555,END=999)QQ
IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
IVCK=0
YON='YES'
END IF
IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
IVCK=1
YON='NO'
END IF
WRITE(6,*)"CHECK FOR TEMP/DENSITY INVERSIONS? ",YON
C
95 IF(YON.EQ.'YES')THEN
WRITE(6,*)
WRITE(6,*)"MAXIMUM TEMP. INVERSION (DEG C) ALLOWED IS ',TTOL
WRITE(6,*)"NEW MAXIMUM TEMPERATURE INVERSION?"
READ(5,555,END=999)QQ
IF(QQ.NE.' ')THEN
WRITE(29,555)QQ
BACKSPACE 29
READ(29,* ,ERR=95)TTOL

```

```

        END IF
C      WRITE(6,*)"MAXIMUM TEMP. INVERSION (DEG C) ALLOWED IS ',TTOL
      & DTOL
96    & WRITE(6,*)"NEW MAXIMUM DENSITY INVERSION?"
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
      WRITE(29,555)QQ
      BACKSPACE 29
      READ(29,*,ERR=96)DTOL
      END IF
      WRITE(6,*)"MAXIMUM DENSITY INVERSION (GM/CM**3) ALLOWED IS ',
      & DTOL
C      WRITE(6,*)
      WRITE(6,*)"CHECK FOR INVERSION BEYOND DEPTH ',ZIVC,' M'
97    WRITE(6,*)"NEW DEPTH?"
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
      WRITE(29,555)QQ
      BACKSPACE 29
      READ(29,*,ERR=97)ZIVC
      END IF
      WRITE(6,*)"DEPTH BOUND FOR INVERSION CHECK ',ZIVC,' M"
      END IF
C      WRITE(6,*)
      YON='YES'
      IF(IBCK.EQ.1)YON='NO'
      WRITE(6,*)"CHECK FOR DEPTHS GREATER THAN BOTTOM? DEFAULT IS "
      & ,YON
      READ(5,555,END=999)QQ
      IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
      IBCK=0
      YON='YES'
      END IF
      IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
      IBCK=1
      YON='NO'
      END IF
      WRITE(6,*)"CHECK FOR DEPTHS GREATER THAN BOTTOM? ",YON
C      IF(YON.EQ.'YES')THEN
      WRITE(6,*)
      WRITE(6,*)"BOTTOM CHECKING - PERMISSIBLE DEPTH ERROR (%) ',BTOL
      WRITE(6,*)"NEW DEPTH ERROR (%)?"
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
      WRITE(29,555)QQ
      BACKSPACE 29
      READ(29,*,ERR=98)BTOL
      END IF

```

```
      WRITE(6,*)'MAXIMUM DEPTH ERROR (%) ALLOWED IS ',BTOL  
      END IF
```

C

```
      WRITE(6,*)  
      YON='YES'  
      IF(LCHK.EQ.1)YON='NO'  
      WRITE(6,*)'CHECK FOR DATA OVER LAND? DEFAULT IS ',YON  
      READ(5,555,END=999)QQ  
      IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN  
          LCHK=0  
          YON='YES'  
      END IF  
      IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN  
          LCHK=1  
          YON='NO'  
      END IF  
      WRITE(6,*)'CHECK FOR DATA OVER LAND? ',YON
```

C

```
      WRITE(6,*)  
      YON='YES'  
      IF(IDCK.EQ.1)YON='NO'  
      WRITE(6,*)'CHECK FOR NEGATIVE, AND NON-MONOTONIC DEPTHS?'  
      WRITE(6,*)'DEFAULT IS ',YON  
      READ(5,555,END=999)QQ  
      IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN  
          IDCK=0  
          YON='YES'  
      END IF  
      IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN  
          IDCK=1  
          YON='NO'  
      END IF  
      WRITE(6,*)'CHECK FOR NEGATIVE AND NON-MONOTONIC DEPTHS? ',YON
```

C

```
      WRITE(6,*)  
      YON='YES'  
      IF(IECK.EQ.1)YON='NO'  
      WRITE(6,*)'CHECK MOODS DUPLICATE PROFILE ERR CODE? DEFAULT IS '  
      ,YON  
      READ(5,555,END=999)QQ  
      IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN  
          IECK=0  
          YON='YES'  
      END IF  
      IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN  
          IECK=1  
          YON='NO'  
      END IF  
      WRITE(6,*)'CHECK MOODS DUPLICATE PROFILE ERR CODE? ',YON
```

C

```
      WRITE(6,*)  
      YON='YES'  
      IF(ITOC.EQ.1)YON='NO'  
      WRITE(6,*)'CHECK IF TEMPERATURES ARE ALL ZERO? DEFAULT IS '
```

```

& ,YON
READ(5,555,END=999)QQ
IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
  ITOC=0
  YON='YES'
END IF
IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
  ITOC=1
  YON='NO'
END IF
WRITE(6,*)"CHECK IF TEMPERATURES ARE ALL ZERO? ",YON

C
WRITE(6,*)
YON='YES'
IF(ISOC.EQ.1)YON='NO'
WRITE(6,*)"CHECK IF SALINITIES ARE ALL ZERO? DEFAULT IS "
& ,YON
READ(5,555,END=999)QQ
IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
  ISOC=0
  YON='YES'
END IF
IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
  ISOC=1
  YON='NO'
END IF
WRITE(6,*)"CHECK IF SALINITIES ARE ALL ZERO? ",YON

C
WRITE(6,*)
YON='YES'
IF(IMIS.EQ.1)YON='NO'
WRITE(6,*)"CHECK FOR MISPLACED PROFILES? DEFAULT IS ",YON
READ(5,555,END=999)QQ
IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
  IMIS=0
  YON='YES'
END IF
IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
  IMIS=1
  YON='NO'
END IF
WRITE(6,*)"CHECK FOR MISPLACED PROFILES? ",YON

C
IF(YON.EQ.'YES')THEN
  WRITE(6,*)
  WRITE(6,*)"MAX STANDARD DEVIATION IS ",STOL
  WRITE(6,*)"NEW MAX STANDARD DEVIATION?"
  READ(5,555,END=999)QQ
  IF(QQ.NE.' ')THEN
    WRITE(29,555)QQ
    BACKSPACE 29
    READ(29,*,ERR=99)STOL
  END IF
  WRITE(6,*)"MAX STANDARD DEVIATION IS ",STOL

```

```

C
100   WRITE(6,*)
      WRITE(6,*)"MAX DEPTH OF NEAR SURFACE TEMP IS ',DMIS,' M'
      WRITE(6,*)"NEW MAX DEPTH?"
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
        WRITE(29,555)QQ
        BACKSPACE 29
        READ(29,*,ERR=100)DMIS
      END IF
      WRITE(6,*)"MAX DEPTH OF NEAR SURFACE TEMP IS ',DMIS,' M'
    END IF

C
    WRITE(6,*)
    YON='YES'
    IF(IDUP.EQ.1)YON='NO'
    WRITE(6,*)"CHECK FOR DUPLICATE PROFILES? DEFAULT IS ',YON
    READ(5,555,END=999)QQ
    IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')THEN
      IDUP=0
      YON='YES'
    END IF
    IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')THEN
      IDUP=1
      YON='NO'
    END IF
    WRITE(6,*)"CHECK FOR DUPLICATE PROFILES? ',YON

C
    IF(YON.EQ.'YES')THEN
      WRITE(6,*)
      WRITE(6,*)"MAX TIME IN MINUTES BETWEEN PROFILES IS ',IMIN
    105   WRITE(6,*)"NEW MAX TIME?"
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
        WRITE(29,555)QQ
        BACKSPACE 29
        READ(29,*,ERR=105)IMIN
      END IF
      WRITE(6,*)"MAX TIME IN MINUTES BETWEEN PROFILES IS ',IMIN

C
    106   WRITE(6,*)
      WRITE(6,*)"MAX DISTANCE IN KM BETWEEN PROFILES IS ',DIST
      WRITE(6,*)"NEW MAX DISTANCE?"
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
        WRITE(29,555)QQ
        BACKSPACE 29
        READ(29,*,ERR=106)DIST
      END IF
      WRITE(6,*)"MAX DISTANCE IN KM BETWEEN PROFILES IS ',DIST
    END IF

C
    WRITE(6,*)
    YON='NO'

```

```

      WRITE(6,*)'CHANGE TEMP AND/OR SAL LIMITS AT DEPTH? ',
      & 'DEFAULT IS ',YON
C
      READ(5,555,END=999)QQ
      IF(QQ(1:1).EQ.'Y'.OR.QQ(1:1).EQ.'y')YON='YES'
      IF(QQ(1:1).EQ.'N'.OR.QQ(1:1).EQ.'n')YON='NO'
      WRITE(6,*)'CHANGE TEMP AND/OR SAL LIMITS AT DEPTH? ',YON
C
      IF(YON.EQ.'YES')THEN
      WRITE(6,*)
110   WRITE(6,*)'NEW DEPTH FOR CHANGING TEMP/SAL LIMITS? ',
      & 'DEFAULT IS ',ZMIN
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
      WRITE(29,555)QQ
      BACKSPACE 29
      READ(29,*,ERR=110)ZMIN
      END IF
      IF(ZMIN.LE.0)GO TO 110
      WRITE(6,*)'NEW DEPTH FOR CHANGING TEMP/SAL LIMITS IS ',ZMIN
      WRITE(6,*)
      WRITE(6,*)'ENTER NEW TEMPERATURE/SALINITY LIMITS'
      WRITE(6,*)
      WRITE(6,*)'MINIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMIN1
112   WRITE(6,*)'NEW MINIMUM TEMPERATURE?'
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
      WRITE(29,555)QQ
      BACKSPACE 29
      READ(29,*,ERR=112)TMIN1
      END IF
      WRITE(6,*)'MINIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMIN1
C
      WRITE(6,*)
      WRITE(6,*)'MAXIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMAX1
114   WRITE(6,*)'NEW MAXIMUM TEMPERATURE?'
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
      WRITE(29,555)QQ
      BACKSPACE 29
      READ(29,*,ERR=114)TMAX1
      END IF
      WRITE(6,*)'MAXIMUM TEMPERATURE (DEG C) ALLOWED IS ',TMAX1
C
      WRITE(6,*)
      WRITE(6,*)'MINIMUM SALINITY ALLOWED IS ',SMINI1
116   WRITE(6,*)'NEW MINIMUM SALINITY?'
      READ(5,555,END=999)QQ
      IF(QQ.NE.' ')THEN
      WRITE(29,555)QQ
      BACKSPACE 29
      READ(29,*,ERR=116)SMINI1
      END IF
      WRITE(6,*)'MINIMUM SALINITY ALLOWED IS ',SMINI1

```

```
C
      WRITE(6,*)
      WRITE(6,*)'MAXIMUM SALINITY ALLOWED IS ',SMAX1
118   WRITE(6,*)'NEW MAXIMUM SALINITY?'
      READ(5,555,END=999)QQ
         IF(QQ.NE.' ')THEN
            WRITE(29,555)QQ
            BACKSPACE 29
            READ(29,*,ERR=118)SMAX1
         END IF
         WRITE(6,*)'MAXIMUM SALINITY ALLOWED IS ',SMAX1
      END IF
C
999   RETURN
      END
```

```
SUBROUTINE SORT(X,IY,NUM)
C THIS ROUTINE SORTS X AND IY BASED ON VARIABLE X
C DIMENSION X(1),IY(1)
C
C IF NO DATA RETURN
C     IF(NUM.EQ.0)RETURN
C
C SORT VARIABLE X
C     IF(NUM.LE.1)GO TO 999
C     DO 150 I=1,NUM
C         IFLAG=0
C         DO 140 J=1,NUM-1
C             IF(X(J).GT.X(J+1))THEN
C                 W=X(J+1)
C                 Z=IY(J+1)
C                 X(J+1)=X(J)
C                 X(J)=W
C                 IY(J+1)=IY(J)
C                 IY(J)=Z
C                 IFLAG=1
C             END IF
C 140    CONTINUE
C         IF(IFLAG.EQ.0)GO TO 999
C 150    CONTINUE
C
C 999    RETURN
C
```

```

SUBROUTINE STATS(ISF,DAT,VMEAN,SDEV,NNUM)

C
REAL*4 VMEAN,SDEV
REAL*8 SUMSQ,SUM,VTERM1,VTERM2,VTERM3
DATA SUMSQ,SUM,NUM/0.00,0.00,0/
C
IF(ISF.EQ.1)GO TO 50
C
C UPDATE STATS
C IF(DAT.LT.-998.)RETURN
SUM=SUM+DAT
SUMSQ=DAT*DAT+SUMSQ
NUM=NUM+1
RETURN
C
C FINALIZE STATS
50 CONTINUE
C NUM MUST BE GREATER THAN 3
IF(NUM.LE.3)THEN
  WRITE(6,*)'NOT ENOUGH DATA FOR MEANINGFUL STANDARD DEVIATION'
  WRITE(6,*)'NEED AT LEAST 4 GOOD PROFILES'
  WRITE(6,*)'TURN OFF MISPLACED PROFILE TEST'
  STOP
END IF
VMEAN=SUM/NUM
SDEV=SUMSQ/NUM
N=NUM
VTERM1=-(N*1.00/(N*1.0-1.0))*1.00*VMEAN*VMEAN
VTERM3=SUMSQ/(1.00*N-1.00)
VTERM2=VTERM1+VTERM3
SDEV=DSQRT(DABS(VTERM2))
NNUM=NUM
RETURN
END

```

```

C*****
C
C   SUBROUTINE VALUEC
C   THIS SUBROUTINE CHECKS FOR BAD TEMPERATURE AND SALINITY VALUES
C
C*****
SUBROUTINE VALUEC(D,T,S,NLEV,IVFLG)
C
COMMON /VALIM/ TMIN1,TMAX1,SMIN1,SMAX1,TEMP,SAL,
&           TMIN2,TMAX2,SMIN2,SMAX2,ZMIN
DIMENSION D(1),T(1),S(1)
C
C   SET MIN AND MAX
    TMIN=TMIN1
    TMAX=TMAX1
    SMIN=SMIN1
    SMAX=SMAX1
C   RESET FLAGS
    IVFLG=0
    IVFLGT=0
    IVFLGS=0
    IVFLGA=0
    IVFLGB=0
    ICHG=0
C   CHECK FOR ALL ZERO VALUES.
C   IF SALINITIES ARE ALL ZERO, IVFLG=1
C   IF TEMPERATURES ARE ALL ZERO, IVFLG=2
C   IF BOTH ARE ALL ZERO, IVFLG=3
    NT=0
    NS=0
    DO 50 I=1,NLEV
C   CHECK FOR ZERO VALUES
    IF(T(I).GT.-0.001.AND.T(I).LT.0.001)NT=NT+1
    IF(S(I).GT.-0.001.AND.S(I).LT.0.001)NS=NS+1
50  CONTINUE
C
    IF(NS.EQ.NLEV.OR.NT.EQ.NLEV)THEN
      IF(NS.EQ.NLEV)THEN
        IVFLGS=1
      END IF
C
      IVFLG=IVFLGS
      IF(NT.EQ.NLEV)IVFLGT=2
      IF(IVFLGT.EQ.2)IVFLG=2
      IF(IVFLGS.EQ.1.AND.IVFLGT.EQ.2)IVFLG=3
      END IF
C
      IF(IVFLG.EQ.3)GO TO 105
C   CHECK FOR VALUES OUTSIDE OF BOUNDS
    DO 100 I=1,NLEV

```

```

C
C CHANGE TEMP AND SAL LIMITS AT DEPTH
  IF(ICHG.EQ.0)THEN
    IF(D(I).GE.ZMIN)THEN
      TMIN=TMIN2
      TMAX=TMAX2
      SMIN=SMIN2
      SMAX=SMAX2
      ICHG=1
    END IF
  END IF
C
  IF(IVFLGT.EQ.2.OR.IVFLGA.EQ.1)GO TO 80
  IF(T(I).LT.-998.9.AND.T(I).GT.-999.1)GO TO 80
  IF(T(I).LT.TMIN.OR.T(I).GT.TMAX)THEN
    IVFLGA=1
    TEMP=T(I)
  END IF
C
  80  IF(IVFLGS.EQ.1.OR.IVFLGB.EQ.1)GO TO 100
  IF(S(I).LT.-998.9.AND.S(I).GT.-999.1)GO TO 100
  IF(S(I).LT.SMIN.OR.S(I).GT.SMAX)THEN
    IVFLGB=1
    SAL=S(I)
  END IF
C
  100 CONTINUE
C  IVFLG=4 FOR BAD TEMP, TEMP AND SAL ARE NON-ZERO
  IF(IVFLGA.EQ.1.AND.IVFLGS.EQ.0)IVFLG=4
C  IVFLG=5 FOR BAD SAL, TEMP AND SAL ARE NON-ZERO
  IF(IVFLGB.EQ.1.AND.IVFLGT.EQ.0)IVFLG=5
C  IVFLG=6 FOR BAD SAL AND BAD TEMP, TEMP AND SAL ARE NON-ZERO
  IF(IVFLGB.EQ.1.AND.IVFLGA.EQ.1)IVFLG=6
C  IVFLG=7 FOR BAD SAL, AND ALL ZERO TEMP
  IF(IVFLGB.EQ.1.AND.IVFLGT.EQ.2)IVFLG=7
C  IVFLG=8 FOR BAD TEMP, AND ALL ZERO SAL
  IF(IVFLGA.EQ.1.AND.IVFLGS.EQ.1)IVFLG=8
  105 RETURN
END

```

```

SUBROUTINE WEMOOD(D,T,S,NLEV,IEOF)
C
C*****THIS PROGRAM WRITES THE MOODS DATA WHICH HAS BEEN EDITED
C   AFTER EXTRACTON FROM THE MOODS DATA BASE
C
C!!!!!!!!!!!!!!THIS ROUTINE MUST BE CHANGED IF A DIFFERENT DATA FORMAT IS!!!!!!
C!!!REQUIRED. SEE DOCUMENTATION CONTAINED IN RDMOOD!!!!!!
C!!!!!!!!!!!!!!THIS ROUTINE MUST BE CHANGED IF A DIFFERENT DATA FORMAT IS!!!!!!
C*****CHARACTER*13 GL1,GL2
C      CHARACTER*131 INPUTS
C      CHARACTER*10 IP
C
C      COMMON /RDCOM/ F(10),ID(10),TOP,BOT,ISEQ
C      COMMON /RDCOMA/ INPUTS,GL1,GL2,IP
C
C      DIMENSION D(1),T(1),S(1)
C
C      DATA LINE/71/,IPAGE/1/
C
C*****WRITE EDITED MOODS OUTPUT FILE
C
C      WRITE HEADER LABEL
LINC=((NLEV-1)/15+1)*3+1
IF(LINE+LINC.LE.70)GO TO 65
LINE=2
      WRITE(INPUTS(98:102),501)IPAGE
501  FORMAT(I5)
      WRITE(21,6440)INPUTS
6440  FORMAT(131A)
      IPAGE=IPAGE+1
65   CONTINUE
C
C      WRITE HEADER
      WRITE(21,5012,ERR=9004)F(1),F(2),GL1,GL2,
      & ID(2),ID(3),ID(4),ID(5),ID(6),TOP,
      & BOT,NLEV,ISEQ
5012  FORMAT(1X,F6.2,F9.2,2X,A13,2X,A10,3I3,2(1X,02),1X,2F9.1,I6,
      & 2X,I6,2X,'----')
C
C      WRITE DEPTHS
      WRITE(21,5013,ERR=9004)(D(I),I=1,NLEV)
5013  FORMAT(15F7.1)
C
C      WRITE TEMPERATURES
      WRITE(21,5014,ERR=9004)(T(I),I=1,NLEV)
5014  FORMAT(1X,15F7.2)
C
C      WRITE SALINITIES
      WRITE(21,5014,ERR=9004)(S(I),I=1,NLEV)

```

```
C      LINE=LINE+LINC
C
C      NORMAL RETURN
C          IEOF=0
C          RETURN
C      ERROR RETURN
9004  IEOF=2
RETURN
END
```

UNCLASSIFIED

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19. ABSTRACT <i>(Continue on reverse if necessary and identify by block number)</i> <p>The Master Oceanographic Observations Data Set (MOODS) contains 3.5 million data observations. The data, which include temperature and salinity profiles, are edited during updates, but this editing has been very superficial and allows for erroneous values. This editor attempts to ferret out the bad data by checking for oceanographic observations that are over land, above the sea surface, below the sea bottom; that have nonmonotonic, duplicate, or negative depths; that contain impossible or all-zero temperatures or salinities; that produce temperature or density inversions; that are misplaced either by location or by season; or that are duplicates. For four MOODS test sets (two Atlantic and two Pacific), the total rejection rate ranged 17-39%. Of these rejections, 9-16% were already flagged during update editing, 1-8% were rejected because of inversions and wild values, and 7-17% were duplicate and misplaced profiles.</p>			
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